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Spawning Areas of British Columbia Herring: A Review, Geographical Analysis and Classification
Volume II: North Coast

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A review, geographical analysis and classification

Volume II

North Coast

by

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VOLUME II

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ABSTRACT

Hay, D. E., P. B. McCarter, R. Kronlund and C. Roy. 1989. Spawning areas of British Columbia herring: a review, geographical analysis and classification. Volume II. North Coast. Can. MS Rep. Fish. Aquat. Sci. 2019: 99 p.

The geographical distribution of herring spawning in British Columbia, was analysed for 50 years, from 1937 to 1986. The analyses was based on approximately 20,000 records of spawning made annually for different regions of the British Columbia coast by Fishery Officers. For each of about 90 geographical subdivisions of the coast, tables are presented to show the annual frequency of spawns in one kilometer segments of the coast. The intensity of spawning in specific areas is shown by histograms. Separate tables present a statistical summary of spawn records, including mean spawning dates. Tables summarizing roe fishery activity (1972-86) are shown for each location. A descriptive summary including a classification of the ecological importance of herring spawning habitat, is presented for each area.

Key words: herring, spawning, British Columbia

RÉSUMÉ

Hay, D. E., P. B. McCarter, R. Kronlund and C. Roy. 1989. Spawning areas of British Columbia herring : a review, geographical analysis and classification. Volume II. North Coast. Can. MS Rep. Fish. Aquat. Sci. 2019: 99 p.

Pendant 50 ans, plus précisément de 1937 à 1986, on a étudié la répartition géographique du frai de hareng en Colombie-Britannique. L'analyse se fonde sur des données extraites d'environ 20 000 rapports annuels sur le frai produits par les agents des pecheries à l'égard dediverses régions côtières de la Colombie-Britannique. Pour chacune des quelque 90 subdivisions géographiques de la côte, on a dressé des tableaux qui montrent la fréquence annuelle de frai dans des segments d'un kilomètre. Des histogrammes montrent l'intensité du frai dans les secteurs particuliers. Des tableaux distincts donnent un résumé statistique des données de frai, y compris les dates moyennes de frai. Il y a également des tableaux illustrant la peche de rogue (1972-1986) à chaque endroit. Chaque secteur fait également l'objet d'un résumé descriptif donnant une classification de l'importance écologique du milieu de frai du hareng.

Mots clés : hareng, frai, Colombie-Britannique

INTRODUCTION

In recent years there has been increased awareness and concern by industry, government and the public about the environmental protection of Pacific herring spawning grounds. A number of nearshore developments, such as oil exploratory activities and mariculture establishments could affect some inter- and subtidal spawning areas used by herring. Much of the British Columbia coast, perhaps 12% or more, has been used as a spawning site at least once during the last 50 years (Hay 1985). However, a much smaller proportion of the coast has been used for repetitive spawning over a number of years. The locations that support repetitive spawning deserve the most attention and consideration from possible environmental impacts. This report provides the basis for identifying significant herring spawning areas and locations which support major herring fisheries.

HERRING SPAWNING RECORDS

Detailed records of herring spawns in British Columbia are collected annually by Fishery Officers (Hay and Kronlund 1987). From 1928 to 1986 a total of nearly 20,000 records from over 1100 locations were recorded. The geographical size of a 'location' can vary from an island or cove measuring only 100 m in length or breadth, to bays or inlets more than 50 km in length. Also, geographical spawning locations frequently are 'clustered' so that sometimes many geographical names are used to describe the same general vicinity. Therefore, the continuity of spawnings cannot be examined by considering only single locations, rather, the adjacent locations should also be considered.

About 70% of all Fishery Officer spawn records have an accompanying map or chart showing the geographical position of each spawning. Records without charts consist of narratives or tables describing the position of each spawn relative to a fixed reference point, such as a Bay, Inlet, Island, etc. For spawn records with accompanying charts, we estimated the geographical positions of each spawn according to 0.1 km intervals along shorelines. This was done in all areas where herring were known to have spawned. Sub-divisions or 'sections' of the Statistical Areas (Hourston and Hamer 1979) were used as the smallest geographical unit. Most sections have a 'zero' position which increases, as high as necessary, to include all of the spawning locations. In several cases, spawning overlaps adjacent sections. In these instances, the spawn positions were made to be continuous between sections. Within most sections, herring spawning was not continuous along the shoreline throughout the whole section. Rather, spawning occurred in several different regions of the section, separated by distances without spawnings. This geographical discontinuity of spawning was reflected in the intervals. The 0.1 km intervals were not defined for the entire coastline but rather only for the

general vicinity of herring spawnings. Therefore, there are geographical gaps in the position numbers. Positions of spawning were defined for each of the 110 sections on the coast that had a sufficient number of records for analysis.

Positions were estimated for records that did not have accompanying charts (about 30%). Using the 70% of the records which did have accompanying charts, an average spawn postion was calculated for each (approximately 1100) location. These 'estimated' spawning positions are distinguished from the measured positions in the analysis. A few locations had no charted spawn positions or an insufficient number to make a reasonable estimate. In these relatively few instances we assigned an 'estimated position' to some location names. This assigned position is distinguished from the measured and estimated positions in the analysis.

The accuracy of the estimated spawn positions varied with the quality of the record. Some positions were provided on fine-scaled, detailed maps, which allowed an estimated spawn position in our analysis to within 0.1 km or finer. Sometimes, however, only coarse-scaled charts were available so the estimated spawn position was accurate only to 1.0 km or more. In practice, the least precise estimated position involved records with very long spawns, longer than 5 km.

THE FORMAT OF THIS REPORT

This report is organized into about 106 sections corresponding approximately to sections of the major Statistical Areas defined by the Department of Fisheries and Oceans (Hourston and Hamer 1979). Since the work was completed, however, there have been some minor changes in the Statistical Area boundaries. Also, there have been minor changes in the boundaries and names used for sections (Haist and Rosenfeld 1988). These changes, however, do not interfere with the geographical analysis presented in this report but for some future analyses, these new geographical modifications will have to be made.

For each section, geographical location figures and as many as five tables are presented in the following order:

(1) The first figure shows an overview chart of the location of the section (highlighted) relative to the whole north, or south coast of British Columbia. (2) The second figure shows a more detailed chart (or charts) in 1-km sections. For most of the figures, only every second km is labelled. (3) Spawn positions, in km segments, by year are summarized in the first table. The symbols on the charts are explained below. (4) The second table shows a histogram of the cumulative frequency of spawning per km segment for spawning data pooled over all years from 1937 to 1986. The symbols are explained below. (5) The third table is a statistical summary of spawning, by year from 1937 to 1986. Details of each of the columns in the table are explained below. (6) The fourth table is a summary narrative which briefly

summarizes and comments on highlights of the preceding data. (7) The last table shows the history of roe fishery catches summarized by location, date, time and hailed roe fishery catch, by gillnet and seines, in each area.

DERIVATION OF SPAWN POSITIONS USED IN THE TABLES

Analysis of spawn position by year (first table in each section)

For any single position on the coast, there are three types of spawn records:

(i) Type 1: records with a geographical name (for example, Departure Bay near Nanaimo) and a documented geographical position, supported by Fishery Officer chart or map;

(ii) Type 2: records with no charted position but with a geographical name that was used to describe locations of spawns. From Type 1 records, an 'average' position, in terms of average km segment, of each geographical name was calculated. For each geographical name, the position of all Type 2 records is shown relative to the 'average' position of the Type 1 records. All spawn data taken prior to 1951 and subsequent to 1983 fall into this category because we have not had the resources to measure the spawn positions.

(iii) Type 3: records with no charted position and a geographical name that was not ever used with 'type 1' spawns. Therefore, the only spawn position that can be used must be roughly estimated by comparing the approximate geographical position relative to the kilometer intervals extended from adjacent spawn records.

The three types of spawn records are shown with different symbols on the tables 'spawn position by year'. In general, most spawn records have the geographic location indicated on charts. Such a spawn record, for a given year and a specific km interval, is indicated by a digit from 1 to 9, representing from one to nine spawn records within that km interval. The digit '1' is the most common record (i.e., a single record) and it could represent a spawn record that occupied (a) the full length interval (i.e., a full km of spawn, perhaps as part of a longer spawning that extended on both sides of the interval) or (b) only part of the interval. For instance, a spawn record of 100 m length would be represented as '1', a single spawning record within that length interval. A spawn record of 500 or 900 m length also would be indicated as '1', or a single record. However, two short adjacent spawn records, say of 100 m length each and occurring within the same km interval, would be indicated by a '2'. Two records occurring at exactly the same place but at different periods would be indicated by a '2'. Similarly, three or more adjacent records within the km interval, or three spawns occurring at different times within the same years but within the km interval would be indicated by the respective digit from '3' to '9'. There are some instances of numerous records of short spawn records, more than nine

per km, and when this occurs the collective records are indicated by the asterisk symbol '*'.

For 'type 2' spawn records (where the geographical position of each record is estimated on the basis of the 'type 1' records with known positions) a single spawn record per km segment is indicated by the small case letter 'a'. Two records are indicated as 'b', three as 'c' and so on until a maximum of 26, shown as 'z'. Instances with more than 26 records per km are indicated with the symbol '#'. There are only a few instances of these symbols in the tables and when they occur, the represented positions are probably too tightly packed relative to the real positions of the spawns. For instance, sometimes when only a geographical name is used as the basis of the spawn position, then that name could apply either to a precise section of the coast (for example, Point Grey, which represents a relatively exact coastal position) or to a broad area (for example, Burrard Inlet which is many km in length). Therefore, type 2 records with geographical names that apply to broad areas will probably appear to be too condensed in the tables of spawn position by year.

Type 3 records are indicated by the hat symbol '^'. There is no attempt to indicated the number of such records per km interval. Therefore a single hat could indicate one or more type 3 spawn records per km segment.

Sometimes, there is more than one type of spawn record per single km interval. This sometimes happens in recent years when precise geographical names are used at one time as well as a new geographical name that has not been used before. Sometimes 'new' or additional names are used to describe some small, late spawns that occur 2-3 weeks after the main spawning activity.

The combination of different types of records, within a single km is as follows:

Record Combination	Symbol
type 1 records only.....1 to 9, then '*'	for 10 or more records
type 2 records only.....a to z, then '#'	for 27 or more records
type 3 records only.....'^'	for 1 or more records
type 1 plus type 2 .....'$'	for 2 or more records
type 1 plus type 3 .....'∂'	for 2 or more records
type 2 plus type 3 .....'ε'	for 2 or more records
type 1 plus type 2 plus type 3 .....'%'	for 3 or more records

Analysis of the cumulative spawn frequency by location (second table in each section)

The explanation of this table is similar to that of the first table. The total number of spawn records recorded for a single km interval is shown for each section. As discussed in the explanation for the first table,

there are three types of records of spawn. In this histogram, the cumulative frequency of type 1, 2 and 3 records is indicated by the symbols '*', '0' and 'I' respectively and in the far right column, the total numbers of records per each km interval are indicated. For instance, a single record of a spawn with a known position, would appear as a '1' or '2' adjacent the '*' symbols. The number of intervals affected would depend on whether a single spawn overlapped the interval boundaries. Another example could be a 5 km spawn record, with a calculated spawn position (type 2) record, would be indicated by a '5' or '6' adjacent the '0' symbols.

Statistical summary of spawning by location (third table in each section)

This table contains a number of columns that provide a year-by-year quantitative history of spawning, summarized for each section. The explanation for each column is described below:

Column	Heading	Explanation
1	Year	The documented year, between 1937 and 1986.
2	Total records	The total number of spawn records (spawn occurrences) per year.
3	Spawn index	An estimate of the area of spawn (m^2) based on conversion factors that correct for the time trends in estimates of spawn intensity and spawn width (see Hay and Kronlund 1987).
4	Sum length	The total length of spawn in metres, for each year.
5	Av wid	The average width of spawn in metres, for each year.
6	Av int	The average intensity of spawn on a scale of 1 (very light) to 9 (very heavy) (For further explanation, see Hay and Kronlund 1987).
7	Av date	The average spawning date presented by the Day of the year (DOY) where Jan. 1 = DOY 1, Jan. 2 = DOY 2, Feb. 1 = 32 DOY, and so on.
8	SE date	The standard error of the mean weighted spawn date.
9	Wt date	The average weighted spawning date. The date (DOY) of each record is 'weighted' by the length of each record. In most instances, the weighted and unweighted are nearly identical.
10	Min day	The earliest spawn date recorded each year, by DOY
11	Max day	The latest spawn date recorded each year, by DOY

12	Ind day	The number of different days over which spawnings occurred. A single spawn record on a single day would be 1. One single record extending over 5 days would be 5, etc.
13	Ind loc	The number of different spawning locations used. For the total coast, there are a total of about 1100 locations. If there were 10 separate small spawns within the same location, the number would be 1.

Herring spawn summary by location (fourth table in each section)

This table is a narrative based on the following criteria. The 'SPAWNING CONSISTENCY OVER TIME' is described as: (i) 'INFREQUENT' if the spawns were recorded in less than 50 percent of documented years, (ii) 'FREQUENT' if the spawns were recorded in 50 to 79 percent of documented years and (iii) 'CONSTANT' if the spawns were recorded in 80 to 100 percent of documented years. The 'MAGNITUDE OF SPAWNINGS' assessed from 1937 to 1986 for each section is described as: (i) 'VERY SMALL' if there was less than 50 hectares of cumulative spawn area, (ii) 'SMALL' if there was 50-200 hectares of cumulative spawn area, (iii) 'MEDIUM' if there was 201-500 hectares of cumulative spawn area, (iv) 'LARGE' if there was 501-1500 hectares of cumulative spawn area and (v) 'VERY LARGE' if there was greater than 1500 hectares of cumulative spawn area.

The history of roe fishery catches by gear type and by location (fifth table in each section)

This table is based on the hailed catches, as reported in annual information bulletins or industry reports (Chalmers et al. 1981, 1982, 1985, 1986 and Humphreys et al. 1972, 1973 and Webb et al 1974, 1975, 1979 and 1980). Catches, in short tons, hailed on the grounds were cited here as they are the most accurate representation of the LOCATION of catches. They may differ from tables reported in the annual catch summaries or stock assessments and forecast reports (Haist et al. 1988) because these documents are usually based on sales slip records. These other reports should be consulted if more accurate total catch figures by major area are required. Furthermore, the first year of the roe fishery (1971) was not included in this compilation due to incomplete or inconsistent records. Also, it should be noted that hailed catches in parenthesis in table 5 indicates herring catch was from two or more sections.

LIMITATIONS AND APPLICATIONS OF THESE ANALYSES

The precise geographical limits of herring spawning probably are accurate to within a kilometer, more in some specific sites and less in others. The original Fishery Officer records were made with varying degrees

of precision and the degree of precision often depends on the area of the spawning or survey; areas which have a lot of relatively fine-scale geographical detail, such as the Gulf Islands in southern Georgia Strait, probably are more accurate than areas with fewer geographical details, such as the relatively straight shoreline between Parksville and Deep Bay. In general however, the summaries presented here should be reasonable indicators of spawning activity to the nearest kilometer.

This geographical compilation and historical synopsis of herring spawns represents the culmination of several earlier but briefer versions. One of the earlier analyses, presented at the Annual Herring Stock Assessment Meetings as PSARC WORKING PAPER 86-5, had widespread distribution and was used for examination and evaluation of ecologically sensitive areas relative to potental impacts from oil exploration activities and mariculture developments.

During the several years of preparatory work that has gone into this project, we often have heard the criticism that the herring spawning data base has limited value because of alleged errors and omissions in the records. The most frequently cited error attributed to the records is that the data collected on the spawn dimensions were made in a sloppy way and "often by the cook on a patrol vessel"; alternately, we have heard that some Fishery Officers could not be bothered to go out and look for herring spawn rather, they simply noted the presence or absence of seabirds and assumed that herring spawn occurred wherever birds occurred. Undoubtably, some of these stories are correct, but probably for not more than a few of the nearly 20,000 records used in these analysis. Based on detailed examination of the original records, it is clear that the overwhelming majority of the Fishery Officers who report on herring spawns, do it in a dedicated, professional and competent manner, often with detailed comments and charts accompanying the records.

There are, nevertheless, two kinds of systematic error in these records which should be mentioned. The first appears to be a time-dependent trend for Fishery Officers to underestimate spawn width. This occurred mainly in the earlier years, when it was generally believed that most of the spawn was confined to the inter-tidal zone. It has not been until relatively recent times that the significance of the subtidal fraction has been appreciated (Haegele et al. 1983). Also, there has been systematic changes in the spawn intensity measurements, in part reflecting changes in the measurement or rating criteria used over the years (see Hay and Kronlund 1987 for more detail). However, neither of these systematic errors have any effect on the analysis in the present study, which does not involve any presentation of the 'spawn index' which is fully described in Hay and Kronlund (1988). The only other kind of error in the records which can severely affect conclusions presented in these analyses, is that of incompleteness. It is clear that for some locations, records were not collected systematically each year. As much as possible we have attempted to comment on this in the narrative summary tables.

The data and analysis that are presented in this document have been available for the last two years, on request, to anyone with an interest in the historical distribution of herring spawning areas. The analyses already have been used many times for examinations of impacts of different nearshore developments. It appears that one of the most useful aspects of the analyses is that some areas are identified clearly as important spawning locations and

others, with no history of herring spawns, are shown to be not important. There are many locations or km segments, however, which are in between. They have a record of spawning which varies in time. These 'intermediate' spawning locations are the most difficult to evaluate in terms of their importance in maintaining the well being of the herring resource.

In general, we suggest that it is essential to conserve the spawning areas that have a history of repetitve spawning over time. Also, areas immediately adjacent to spawning areas must be protected. Ultimately however, each instance of a nearshore development that might impact herring spawning areas must be decided on its own merits and it should be kept in mind that we still do not understand why some areas are used as spawning areas and others are not. Some locations which are not known as spawning areas appear to have the appropriate vegetative substrate and local oceanographic regimes that are found in documented spawning areas (Hay et al. 1984). Further, herring 'enhancement' does not appear to be possible at the present time (Hay and Marliave 1988). Therefore, if herring spawning habitat is lost, we cannot necessarily expect the impacted stocks to spawn in other locations nor can we realistically expect that new spawning habitat can be created. Finally, throughout this report we have commonly used the word "stock" or "resident stock" that refer to herring that inhabit an area. This usage is for convenience only, and cannot be used as an indicator of any particular uniqueness (genetic or otherwise) of herring from one place to the other.

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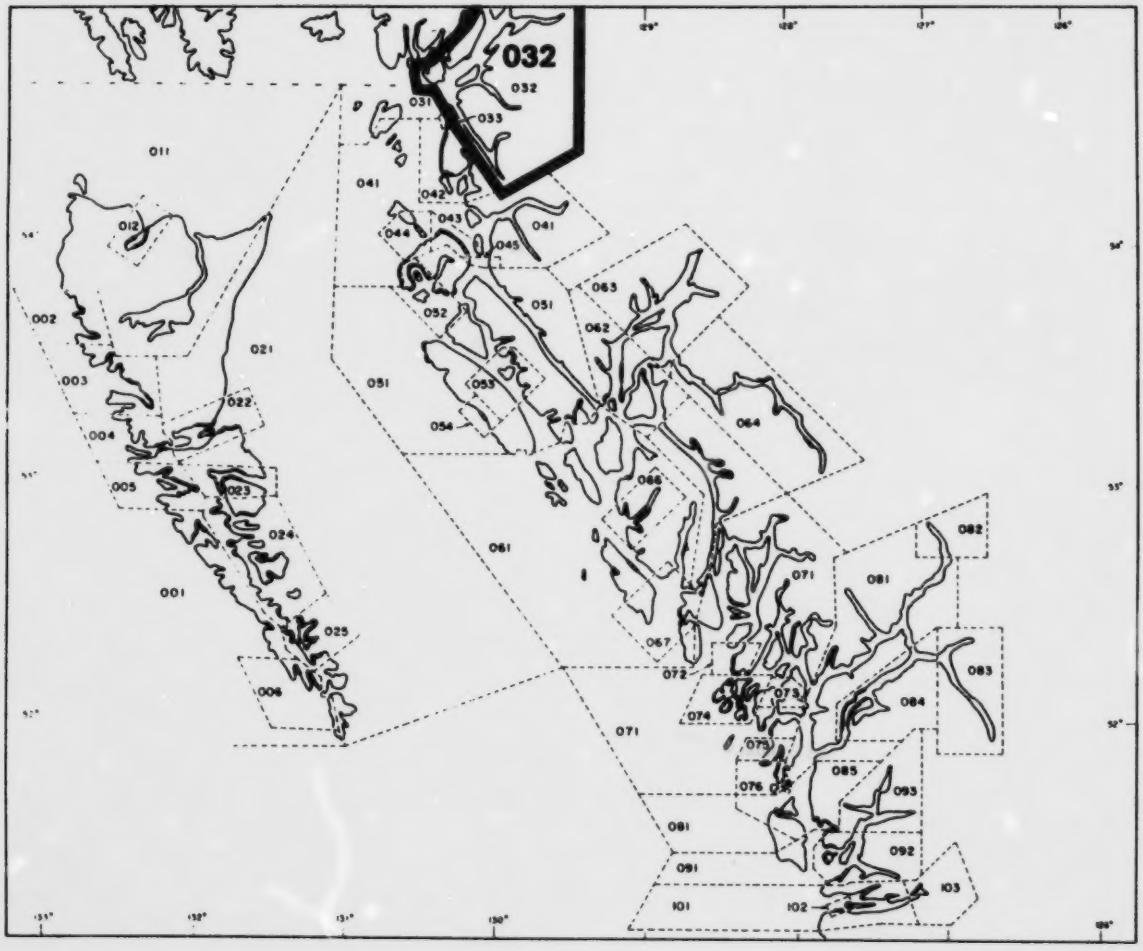

Fig. 032-1. Overview map showing location of section 032, Portland Inlet.

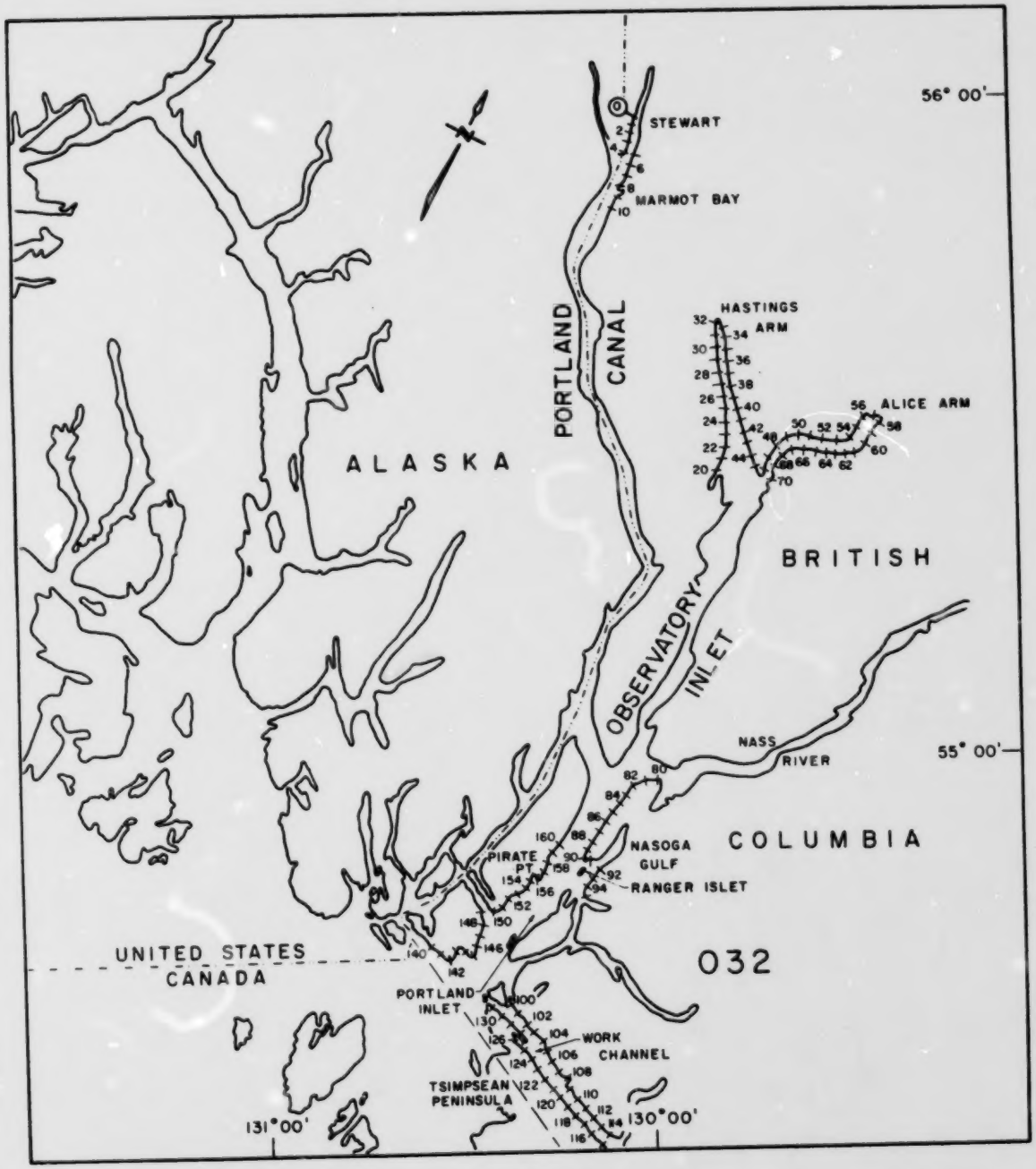

Fig. 032-2. Detailed map of section 032, Portland Inlet.

Table 032-2. Section 032 - histogram of cumulative spawn frequency over distance

	position(km)	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75	vara	varb	varc	all
STEWART MARINA	0.00	+I	0	0	1	1
	1.00	+	0	0	0	0
	2.00	+	0	0	0	0
	3.00	+	0	0	0	0
	4.00	+	0	0	0	0
	5.00	+	0	0	0	0
	6.00	+	0	0	0	0
	7.00	+II	0	0	2	2
MARMOT BAY	8.00	+II	0	0	2	2
	9.00	+	0	0	0	0
	10.00	+	0	0	0	0
	11.00	+	0	0	0	0
	12.00	+	0	0	0	0
	13.00	+	0	0	0	0
	14.00	+	0	0	0	0
	15.00	+	0	0	0	0
	16.00	+	0	0	0	0
	17.00	+	0	0	0	0
	18.00	+	0	0	0	0
	19.00	+	0	0	0	0
	20.00	+	0	0	0	0
	21.00	+	0	0	0	0
	22.00	+	0	0	0	0
	23.00	+	0	0	0	0
	24.00	+	0	0	0	0
	25.00	+	0	0	0	0
	26.00	+	0	0	0	0
	27.00	+	0	0	0	0
	28.00	+	0	0	0	0
	29.00	+	0	0	0	0
	30.00	+II	0	0	2	2
	31.00	+IIIIIII	0	0	7	7
HASTINGS ARM	32.00	+IIIIIII	0	0	7	7
	33.00	+II	0	0	2	2
		0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75	vara	varb	varc	all

Table 032-2 (cont'd.)

position(km)

	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75	vara	varh	varc	all
34.00	+	0	0	0	0
35.00	+	0	0	0	0
36.00	+	0	0	0	0
37.00	+	0	0	0	0
38.00	+	0	0	0	0
39.00	+	0	0	0	0
40.00	+	0	0	0	0
41.00	+	0	0	0	0
42.00	+	0	0	0	0
43.00	+	0	0	0	0
44.00	+	0	0	0	0
45.00	+	0	0	0	0
46.00	+	0	0	0	0
47.00	+	0	0	0	0
48.00	+	0	0	0	0
49.00	+	0	0	0	0
50.00	+	0	0	0	0
51.00	+	0	0	0	0
52.00	+	0	0	0	0
53.00	+	0	0	0	0
54.00	+	0	0	0	0
55.00	+IIIIIIIIIIIIIII	0	0	14	14
ALICE ARM 56.00	+IIIIIIIIIIIIIII	0	0	14	14
57.00	+	0	0	0	0
58.00	+	0	0	0	0
59.00	+	0	0	0	0
60.00	+	0	0	0	0
61.00	+	0	0	0	0
62.00	+	0	0	0	0
63.00	+	0	0	0	0
64.00	+	0	0	0	0
65.00	+	0	0	0	0
66.00	+	0	0	0	0
67.00	+	0	0	0	0
68.00	+	0	0	0	0
	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75	vara	varh	varc	all

Table 032-2 (cont'd.)

position(km)

		0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	vara	varb	varc	all
	69.00	+																0	0	0	0
	70.00	+																0	0	0	0
	71.00	+																0	0	0	0
	72.00	+																0	0	0	0
	73.00	+																0	0	0	0
	74.00	+																0	0	0	0
	75.00	+																0	0	0	0
	76.00	+																0	0	0	0
	77.00	+																0	0	0	0
	78.00	+																0	0	0	0
	79.00	+																0	0	0	0
NASS RIVER	80.00	+																0	0	0	0
	81.00	+																0	0	0	0
	82.00	+																0	0	0	0
	83.00	+																0	0	0	0
	84.00	+																0	0	0	0
	85.00	+																0	0	0	0
	86.00	+																0	0	0	0
	87.00	+																0	0	0	0
	88.00	+																0	0	0	0
	89.00	+																0	0	0	0
	90.00	+III																0	0	3	3
NASOGA GULF	91.00	+III																0	0	3	3
	92.00	+I																0	0	1	1
RANGER ISLAND +	93.00	+I																0	0	1	1
	94.00	+																0	0	0	0
	95.00	+																0	0	0	0
	96.00	+																0	0	0	0
	97.00	+																0	0	0	0
	98.00	+																0	0	0	0
	99.00	+																0	0	0	0
	100.00	+																0	0	0	0
	101.00	+																0	0	0	0
	102.00	+																0	0	0	0
	103.00	+																0	0	0	0
		0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	vara	varb	varc	all

Table 032-2 (cont'd.)

position(km)

		0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	vara	varh	varc	all
	104.00	+																0	0	0	0
	105.00	+																0	0	0	0
	106.00	+																0	0	0	0
	107.00	+																0	0	0	0
	108.00	+																0	0	0	0
	109.00	+																0	0	0	0
	110.00	+																0	0	0	0
	111.00	+																0	0	0	0
	112.00	+																0	0	0	0
	113.00	+I																0	0	1	1
WORK CHANNEL	114.00	+I																0	0	1	1
	115.00	+																0	0	0	0
	116.00	+I																0	0	1	1
	117.00	+I																0	0	1	1
	118.00	+I																0	0	1	1
	119.00	+II																0	0	2	2
TSIMPSEAN PENINSULA	120.00	+II																0	0	2	2
	121.00	+I																0	0	1	1
	122.00	+I																0	0	1	1
	123.00	+I																0	0	1	1
	124.00	+																0	0	0	0
	125.00	+																0	0	0	0
	126.00	+																0	0	0	0
	127.00	+																0	0	0	0
	128.00	+																0	0	0	0
	129.00	+																0	0	0	0
	130.00	+																0	0	0	0
	131.00	+																0	0	0	0
	132.00	+																0	0	0	0
	133.00	+																0	0	0	0
	134.00	+																0	0	0	0
	135.00	+																0	0	0	0
	136.00	+																0	0	0	0
	137.00	+																0	0	0	0
	138.00	+																0	0	0	0
		0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	vara	varh	varc	all

Table 032-2 (Cont'd.)

position(km)

		0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	vara	varb	varc	all
	139.00	+																0	0	0	0
	140.00	+																0	0	0	0
	141.00	+																0	0	0	0
	142.00	+																0	0	0	0
	143.00	+																0	0	0	0
	144.00	+																0	0	0	0
	145.00	+																0	0	0	0
	146.00	+																0	0	0	0
	147.00	+																0	0	0	0
	148.00	+																0	0	0	0
	149.00	+IIII																0	0	4	4
PORTLAND INLET	150.00	+IIII																0	0	4	4
	151.00	+																0	0	0	0
	152.00	+																0	0	0	0
	153.00	+																0	0	0	0
	154.00	+I																0	0	1	1
	155.00	+II																0	0	2	2
PIRATE POINT	156.00	+II																0	0	2	2
	157.00	+I																0	0	1	1
	158.00	+																0	0	0	0
		0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	vara	varb	varc	all

Table 032-3. Herring statistical spawn summary for section 032.

Year	Total records	Spawn index	Sum length	Av wid	Av int	Av date	SE date	Wt date	Min day	Max day	Ind day	Ind loc
1937	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1938	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1939	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1940	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1941	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1942	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1943	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1944	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1945	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1946	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1947	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1948	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1949	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1950	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1951	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1952	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1953	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1954	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1955	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1956	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1957	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1958	2	151301	8226	28	6.0	85.0	0.00	85.0	85	85	1	1
1959	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1960	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1961	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1962	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1963	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1964	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1965	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1966	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1967	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1968	1	8406	457	4	6.0	140.0	0.00	140.0	140	140	1	1
1969	1	846	46	18	3.0	141.0	0.00	141.0	141	141	1	1
1970	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1971	1	3366	183	55	1.0	79.0	0.00	79.0	79	79	1	1
1972	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1973	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1974	1	6732	366	9	7.0	140.0	0.00	140.0	140	140	1	1
1975	1	16811	914	9	3.0	152.0	0.00	152.0	152	152	1	1
1976	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1977	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1978	2	47748	2596	4	2.5	137.0	0.00	137.0	137	137	1	1
1979	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1980	1	11772	640	18	7.0	98.0	0.00	98.0	98	98	1	1
1981	5	61377	3337	56	0.0	69.0	0.32	69.0	68	70	3	2
1982	16	157223	8548	9	0.0	77.0	0.00	77.0	77	77	1	2
1983	6	87827	4775	5	0.0	69.3	1.05	69.2	66	71	2	3
1984	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1985	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1986	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
All	37	553409	30088	17	4.4	85.1	4.16	86.8	66	152	13	10

Table 032-4. Spawn summary for section 032 from 1937 to 1986.

A. GENERAL:

There are two main spawning areas in this Portland Inlet section:
(i) the upper reaches, including Hastings Arm and Alice Arm, and
(ii) the lower reaches, including Nasoga Gulf and Work Channel

B. COMPLETENESS OF RECORDS:

Probably all spawning records prior to 1958 are incomplete.

C. SPAWNING CONSISTENCY OVER TIME: INFREQUENT

There have been intermittent spawnings since 1958.

D. MAGNITUDE OF SPAWNINGS: SMALL

1. NUMBER OF SPAWN YEARS/50 YEARS	= 11/50 (1937-86)
2. NUMBER OF SPAWN YEARS/DOCUMENTED YEARS	= 11/29 (1958-86)
3. CUMULATIVE SPAWN LENGTH	= 30.1 Km.
4. CUMULATIVE SPAWN AREA	= 55.3 ha.

E. SPAWNING TIME:

1. MEAN UNWEIGHTED DATE (DOY)	= March 27 (86.1)
2. MEAN WEIGHTED DATE (DOY)	= March 28 (86.8)

F. COMMENTS:

The consistency of spawning in the upper reaches of Portland Canal and Observatory Inlet is uncertain, particularly because records and samples from these areas may be incomplete. There are very few records from the head of Portland Inlet, Marmot Bay, so this would not appear to be a unique spawning population. There are about 20 records from the combined Hastings Arm and Alice Arm areas, but nearly all records were made within 2 years, 1981 and 1982. Therefore, it seems unlikely that these areas constitute a separate spawning population, particulary when the recorded spawn dates in mid-March, are roughly similar.

G. ROE FISHERIES:

No major roe fisheries are documented.

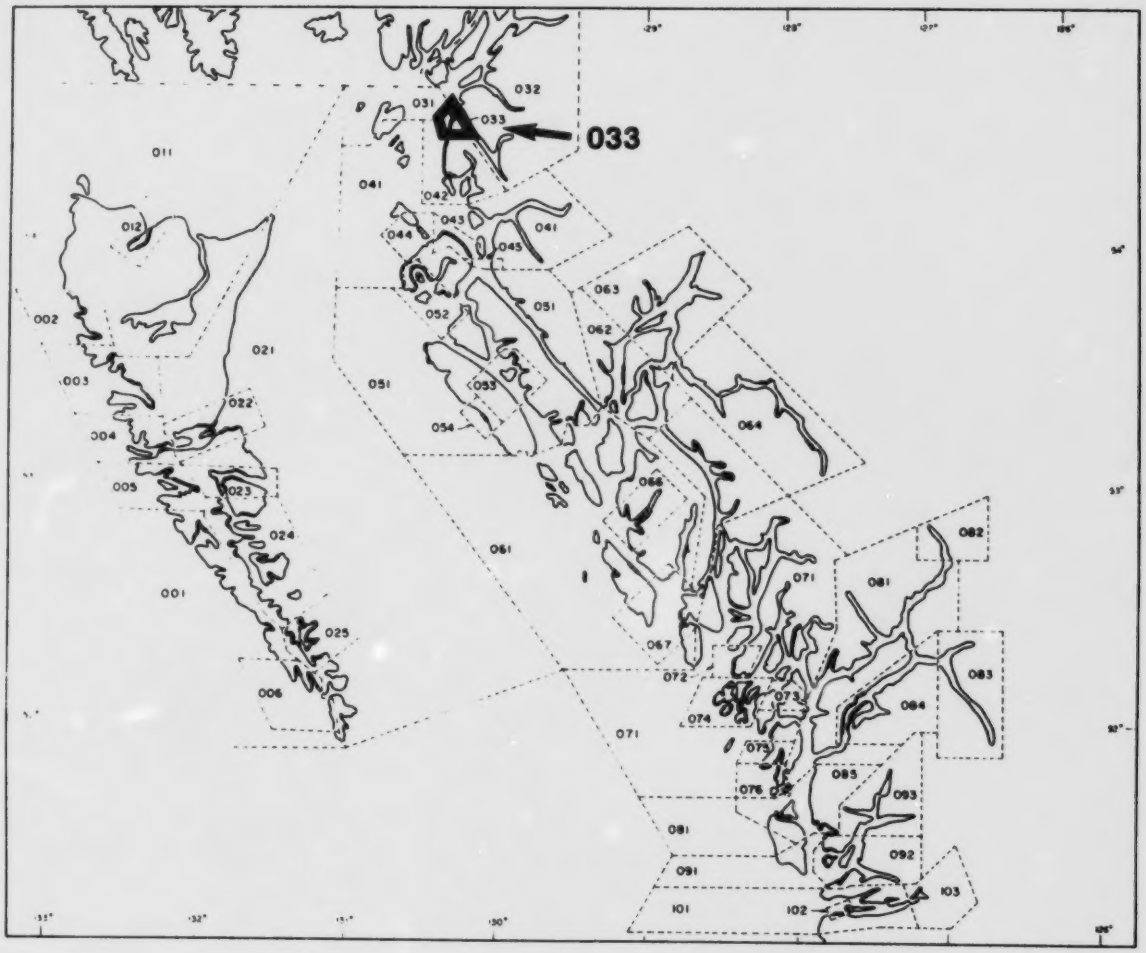

Fig. 033-1. Overview map showing location of section 033, Port Simpson.

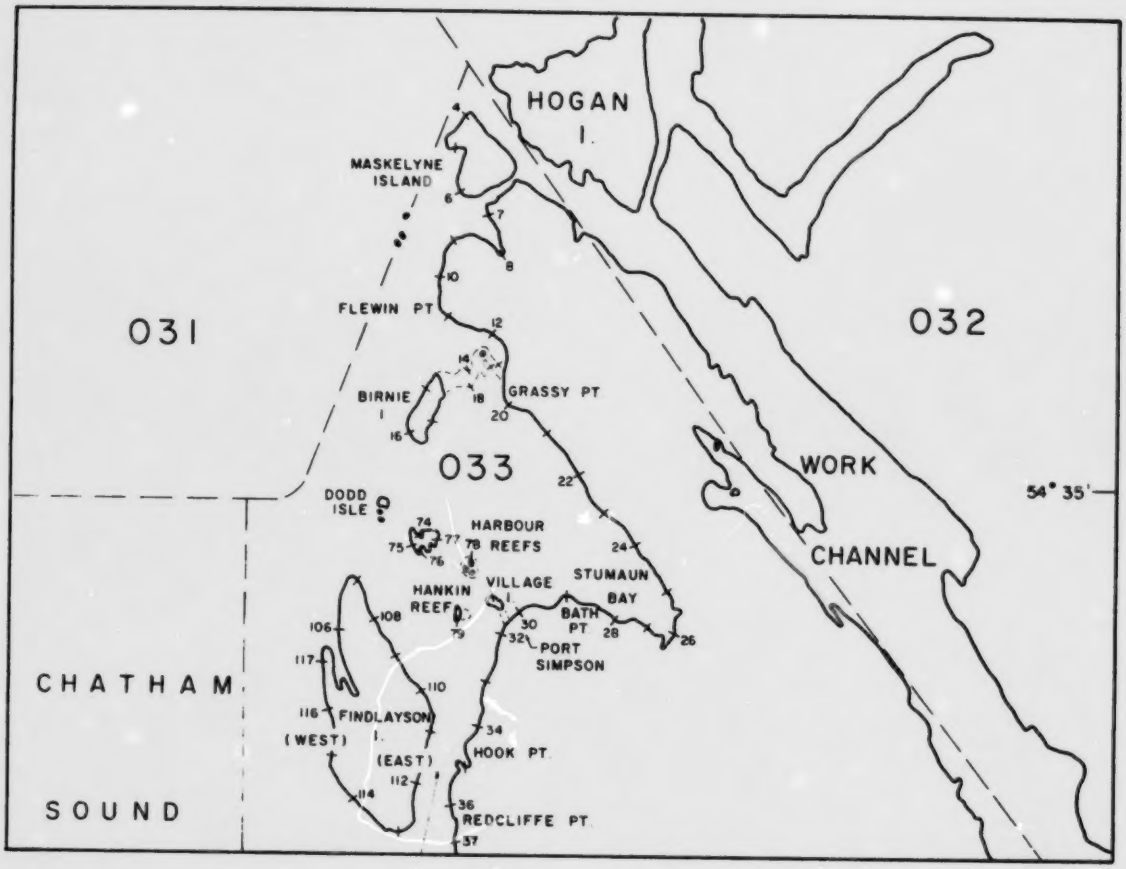

Fig. 033-2. Detailed map of section 033, Port Simpson.

Table 033-1. Section 033 - spawn position by year.

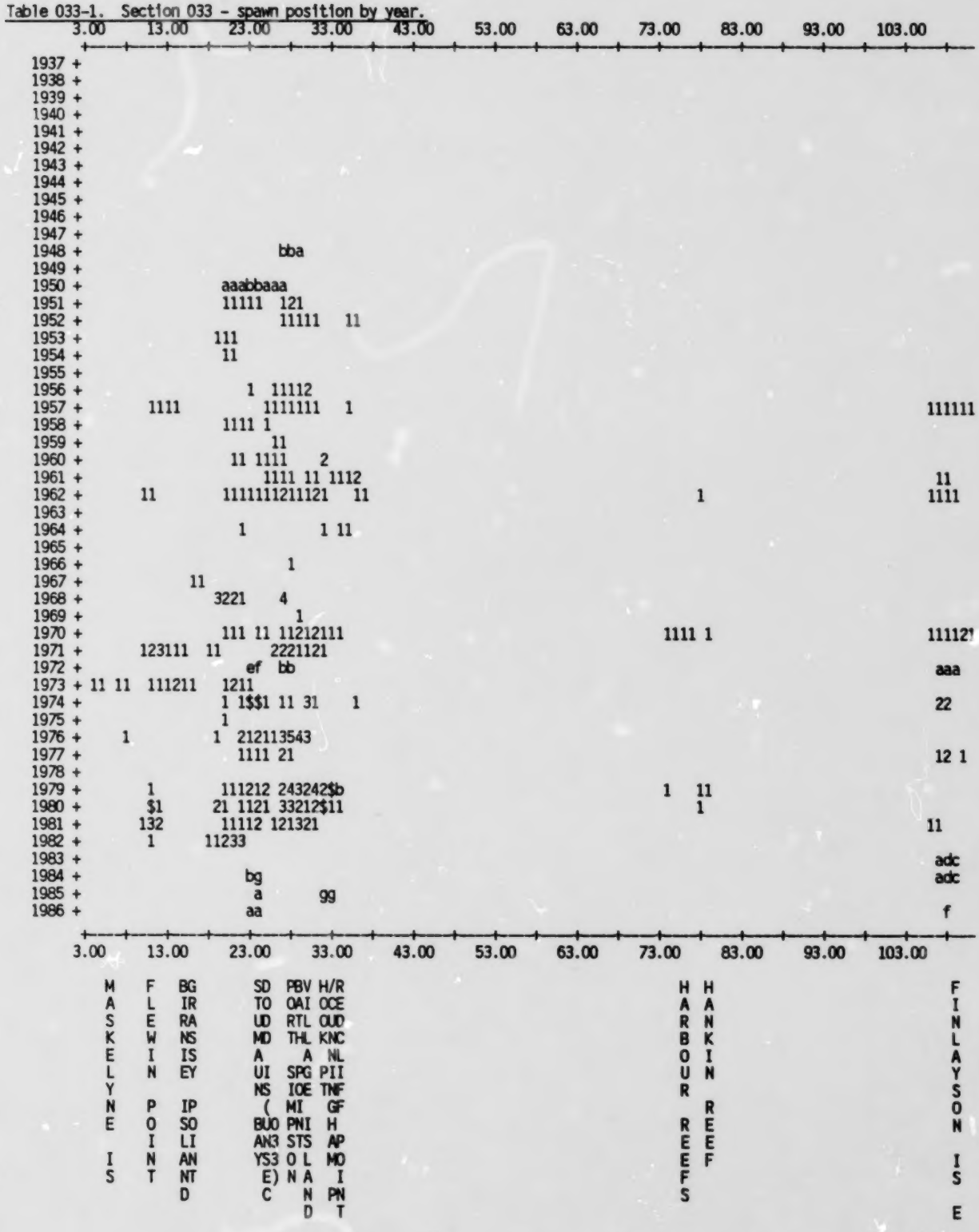

Table 033-2. Section 033 - Histogram of cumulative spawn frequency over distance

	position(km)	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75	vara	varb	varc	all
	2.00	+	0	0	0	0
	3.00	+	0	0	0	0
	4.00	+*	1	0	0	1
	5.00	+*	1	0	0	1
MASKELYNE ISLAND	6.00	+	0	0	0	0
	7.00	+*	1	0	0	1
	8.00	+**	2	0	0	2
	9.00	+	0	0	0	0
	10.00	+***	3	0	0	3
FLEWIN POINT	11.00	+**********0	11	1	0	12
	12.00	+********	8	0	0	8
	13.00	+***	3	0	0	3
	14.00	+****	4	0	0	4
BIRNIE ISLAND	15.00	+**	2	0	0	2
GRASSY POINT	16.00	+**	2	0	0	2
	17.00	+*	1	0	0	1
	18.00	+**	2	0	0	2
	19.00	+*********	9	0	0	9
	20.00	+****************0	16	1	0	17
	21.00	+****************0	16	1	0	17
	22.00	+******************0	18	1	0	19
	23.00	+**********000000000000	12	12	0	24
STUMAUN BAY	24.00	+**************00000000000000000000	15	21	0	36
DODD ISLE (UNSEC 033)	25.00	+**********0	12	1	0	13
	26.00	+**********0	10	1	0	11
	27.00	+******************************00000	29	5	0	34
PORT SIMPSON	28.00	+****************************0000	26	4	0	30
BATH POINT	29.00	+**********************0	21	1	0	22
VILLAGE ISLAND	30.00	+********************	19	0	0	19
	31.00	+******************	17	0	0	17
HOOK POINT /CUNNINGHAM P	32.00	+**********0000000000	12	10	0	22
REDCLIFF POINT	33.00	+****000000000	4	9	0	13
	34.00	+****00	4	2	0	6
	35.00	+****	4	0	0	4
		0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75	vara	varb	varc	all

Table 033-2 (cont'd.)

position(km)

	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75	vara	varh	varc	all
36.00	+*****	5	0	0	5
37.00	+*	1	0	0	1
38.00	+	0	0	0	0
39.00	+	0	0	0	0
40.00	+	0	0	0	0
41.00	+	0	0	0	0
42.00	+	0	0	0	0
43.00	+	0	0	0	0
44.00	+	0	0	0	0
45.00	+	0	0	0	0
46.00	+	0	0	0	0
47.00	+	0	0	0	0
48.00	+	0	0	0	0
49.00	+	0	0	0	0
50.00	+	0	0	0	0
51.00	+	0	0	0	0
52.00	+	0	0	0	0
53.00	+	0	0	0	0
54.00	+	0	0	0	0
55.00	+	0	0	0	0
56.00	+	0	0	0	0
57.00	+	0	0	0	0
58.00	+	0	0	0	0
59.00	+	0	0	0	0
60.00	+	0	0	0	0
61.00	+	0	0	0	0
62.00	+	0	0	0	0
63.00	+	0	0	0	0
64.00	+	0	0	0	0
65.00	+	0	0	0	0
66.00	+	0	0	0	0
67.00	+	0	0	0	0
68.00	+	0	0	0	0
69.00	+	0	0	0	0
70.00	+	0	0	0	0
	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75	vara	varh	varc	all

Table 033-2 (cont'd.)

position(km)

		0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	vara	varb	varc	all
	71.00	+																0	0	0	0
	72.00	+																0	0	0	0
	73.00	+																0	0	0	0
	74.00	+**																2	0	0	2
	75.00	+*																1	0	0	1
HARBOUR REEFS	76.00	+*																1	0	0	1
	77.00	+*																1	0	0	1
	78.00	+***																3	0	0	3
HANKIN REEF	79.00	+**																2	0	0	2
	80.00	+																0	0	0	0
	81.00	+																0	0	0	0
	82.00	+																0	0	0	0
	83.00	+																0	0	0	0
	84.00	+																0	0	0	0
	85.00	+																0	0	0	0
	86.00	+																0	0	0	0
	87.00	+																0	0	0	0
	88.00	+																0	0	0	0
	89.00	+																0	0	0	0
	90.00	+																0	0	0	0
	91.00	+																0	0	0	0
	92.00	+																0	0	0	0
	93.00	+																0	0	0	0
	94.00	+																0	0	0	0
	95.00	+																0	0	0	0
	96.00	+																0	0	0	0
	97.00	+																0	0	0	0
	98.00	+																0	0	0	0
	99.00	+																0	0	0	0
	100.00	+																0	0	0	0
	101.00	+																0	0	0	0
	102.00	+																0	0	0	0
	103.00	+																0	0	0	0
	104.00	+																0	0	0	0
	105.00	+																0	0	0	0
	106.00	+****																4	0	0	4
	107.00	+********000																8	3	0	11
		0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	vara	varb	varc	all

Table 033-2 (cont'd.)

position(km)

		0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	vara	varh	varc	all
FINLAYSON ISLAND EAST	108.00	+********				00000000000000												8	15	0	25
	109.00	+***	0000000															3	7	0	10
	110.00	+****																4	0	0	4
	111.00	+**																2	0	0	2
	112.00	+*																1	0	0	1
	113.00	+																0	0	0	0
		0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	vara	varh	varc	all

Table 033-3. Herring statistical spawn summary for section 033.

Year	Total records	Spawn index	Sum length	Av wid	Av int	Av date	SE date	Wt date	Min day	Max day	Ind day	Ind loc
1937	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1938	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1939	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1940	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1941	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1942	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1943	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1944	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1945	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1946	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1947	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1948	2	51689	2742	14	3.0	68.0	0.00	68.0	68	68	1	1
1949	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1950	2	139780	7415	46	4.0	93.5	2.50	95.6	91	96	2	1
1951	3	120628	6399	38	5.0	90.0	0.00	90.0	90	90	1	1
1952	2	69881	3707	25	4.0	92.0	0.00	92.0	92	92	1	1
1953	1	34950	1854	5	4.0	90.0	0.00	90.0	90	90	1	1
1954	1	25845	1371	5	3.0	79.0	0.00	79.0	79	79	1	1
1955	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1956	4	65884	3495	20	4.5	89.0	0.00	89.0	89	89	1	3
1957	4	298072	15812	23	5.0	98.8	3.50	97.0	91	108	3	3
1958	3	51689	2742	5	3.0	80.0	0.00	80.0	80	80	1	1
1959	1	17230	914	6	3.0	87.0	0.00	87.0	87	87	1	1
1960	4	82699	4387	17	4.8	100.8	7.78	97.1	79	112	3	2
1961	7	140591	7458	24	3.9	91.7	0.64	90.7	89	94	4	4
1962	9	304538	16155	13	4.8	94.9	2.45	96.6	77	102	7	7
1963	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1964	4	2338	124	4	3.0	111.8	1.11	112.4	110	115	3	2
1965	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1966	1	3450	183	27	1.0	99.0	0.00	99.0	99	99	1	1
1967	2	13780	731	41	4.0	108.5	0.50	108.3	108	109	2	1
1968	9	85320	4526	13	4.6	116.8	0.28	117.3	116	118	3	1
1969	1	3450	183	18	5.0	129.0	0.00	129.0	129	129	1	1
1970	9	342014	18143	73	3.6	102.2	0.22	102.4	102	104	2	6
1971	11	224346	11901	44	5.0	103.4	1.11	102.6	101	112	4	3
1972	9	168848	8957	15	3.7	95.3	0.67	95.9	94	98	2	3
1973	8	123625	6558	32	4.0	94.5	1.04	94.5	92	98	3	4
1974	19	120232	6378	15	4.6	92.1	2.72	95.2	89	141	4	3
1975	1	1715	91	14	3.0	104.0	0.00	104.0	104	104	1	1
1976	20	87393	4636	16	3.6	94.0	0.40	93.7	93	97	2	2
1977	9	111975	5940	51	2.0	110.9	8.26	102.3	90	137	2	2
1978	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1979	21	311249	16511	35	4.6	100.8	4.27	95.0	90	135	3	8
1980	23	247344	13121	36	2.0	88.2	0.59	87.2	85	93	5	8
1981	13	198576	10534	35	0.0	84.8	3.55	85.6	79	127	6	7
1982	9	57496	3050	10	0.0	86.0	0.00	86.0	86	86	1	2
1983	4	84830	4500	24	0.0	115.0	0.00	115.0	115	115	1	1
1984	11	124982	6630	25	0.0	94.4	5.17	105.1	82	116	2	2
1985	8	13007	690	23	0.0	87.6	0.38	87.9	85	88	2	2
1986	7	17908	950	19	0.0	115.3	4.71	99.2	87	120	2	2
All	242	3747353	198788	27	3.8	96.3	0.88	95.7	68	141	42	15

Table 033-4. Spawn summary for section 033 from 1937 to 1986.

A. GENERAL:

There is one main spawning area in this Port Simpson section centered in the vicinity of Stumaun Bay.

B. COMPLETENESS OF RECORDS:

Probably all spawning records prior to 1948 are incomplete.

C. SPAWNING CONSISTENCY OVER TIME: CONSTANT

If pooled among all localities, there has been a nearly constant annual record of spawnings since 1948 except for the years, 1949, 1955, 1963, 1965 and 1978.

D. MAGNITUDE OF SPAWNINGS: MEDIUM

1. NUMBER OF SPAWN YEARS/50 YEARS	= 34/50 (1937-86)
2. NUMBER OF SPAWN YEARS/DOCUMENTED YEARS	= 34/39 (1948-86)
3. CUMULATIVE SPAWN LENGTH	= 198.8 Km.
4. CUMULATIVE SPAWN AREA	= 374.7 ha.

E. SPAWNING TIME:

1. MEAN UNWEIGHTED DATE (DOY)	= April 6 (96.3)
2. MEAN WEIGHTED DATE (DOY)	= April 6 (95.7)

F. COMMENTS:

Section 033 is immediately adjacent to section 042 and spawn deposition is frequently continuous between the two sections. The mean spawning dates are similar between section 033 and 042. Therefore, for these reasons, Port Simpson (or section 033) should be regarded as the northern edge of the spawning population which is centered in Chatham Sound, or section 042.

G. ROE FISHERIES:

1. NUMBER OF SEINE FISHERY YEARS/15 YEARS	= 5/15 (1972-86)
2. NUMBER OF GILLNET FISHERY YEARS/15 YEARS	= 3/15 (1972-86)
3. MEAN SEINE CATCH/YEAR	= 2016 tons
4. MEAN GILLNET CATCH/YEAR	= 890 tons

Table 033-5. History of roe fishery catches by gear type in Port Simpson.

SECT. 033	SEINE NET ROE FISHERIES				GILLNET ROE FISHERIES			
YEAR	DATE OPEN (D/Mo)	TIME OPEN (hrs)	HAILED CATCH (Tons)	FISHING AREA	DATE OPEN (D/Mo)	TIME OPEN (hrs)	HAILED CATCH (Tons)	FISHING AREA
1972	25/03-01/04	144	(5729)	Port Simpson & Kitkatla	-	-	-	-
1973	-	-	-	-	-	-	-	-
1974	25/03-27/03	46	1000	Port Simpson	24/03-29/03	120	320	Port Simpson
1975	-	-	-	-	-	-	-	-
1976	31/03	0.3	1400	Port Simpson	-	-	-	-
1977	29/03	0.3	4062	Port Simpson	27/03-29/03	50	650	Port Simpson
1978	30/03 & 31/03	7.0	1600	Port Simpson	30/03-31/03	24	1700	Port Simpson
1979	-	-	-	-	-	-	-	-
1980	-	-	-	-	-	-	-	-
1981	-	-	-	-	-	-	-	-
1982	-	-	-	-	-	-	-	-
1983	-	-	-	-	-	-	-	-
1984	-	-	-	-	-	-	-	-
1985	-	-	-	-	-	-	-	-
1986	-	-	-	-	-	-	-	-

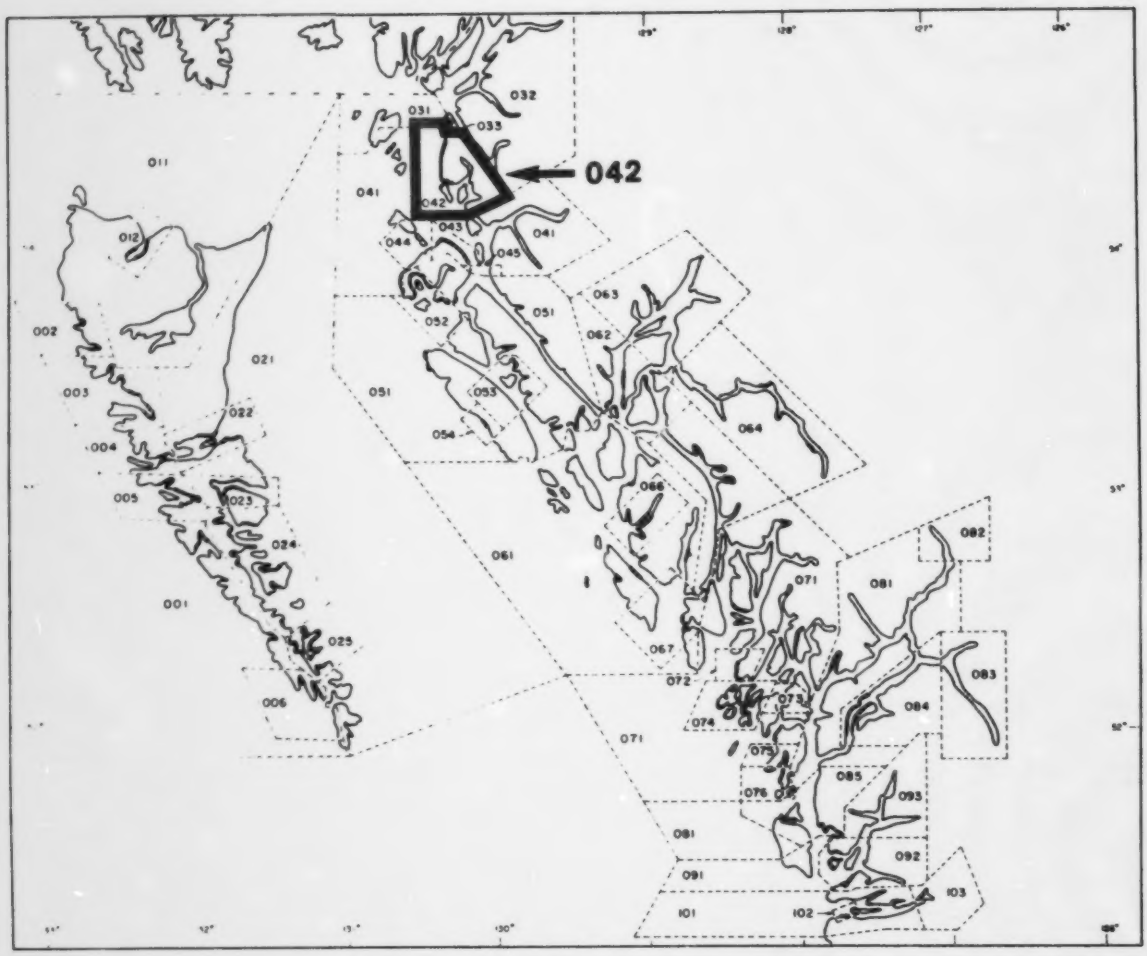

Fig. 042-1. Overview map showing location of section 042, Big Bay.

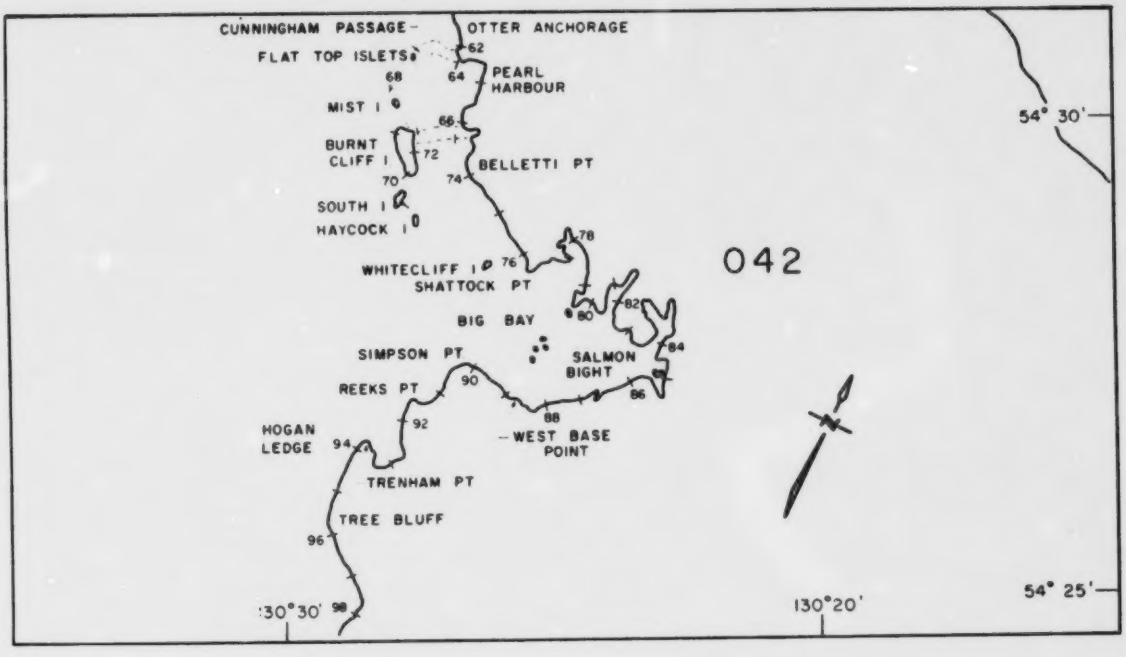

Fig. 042-2. Detailed map of section 042, Big Bay.

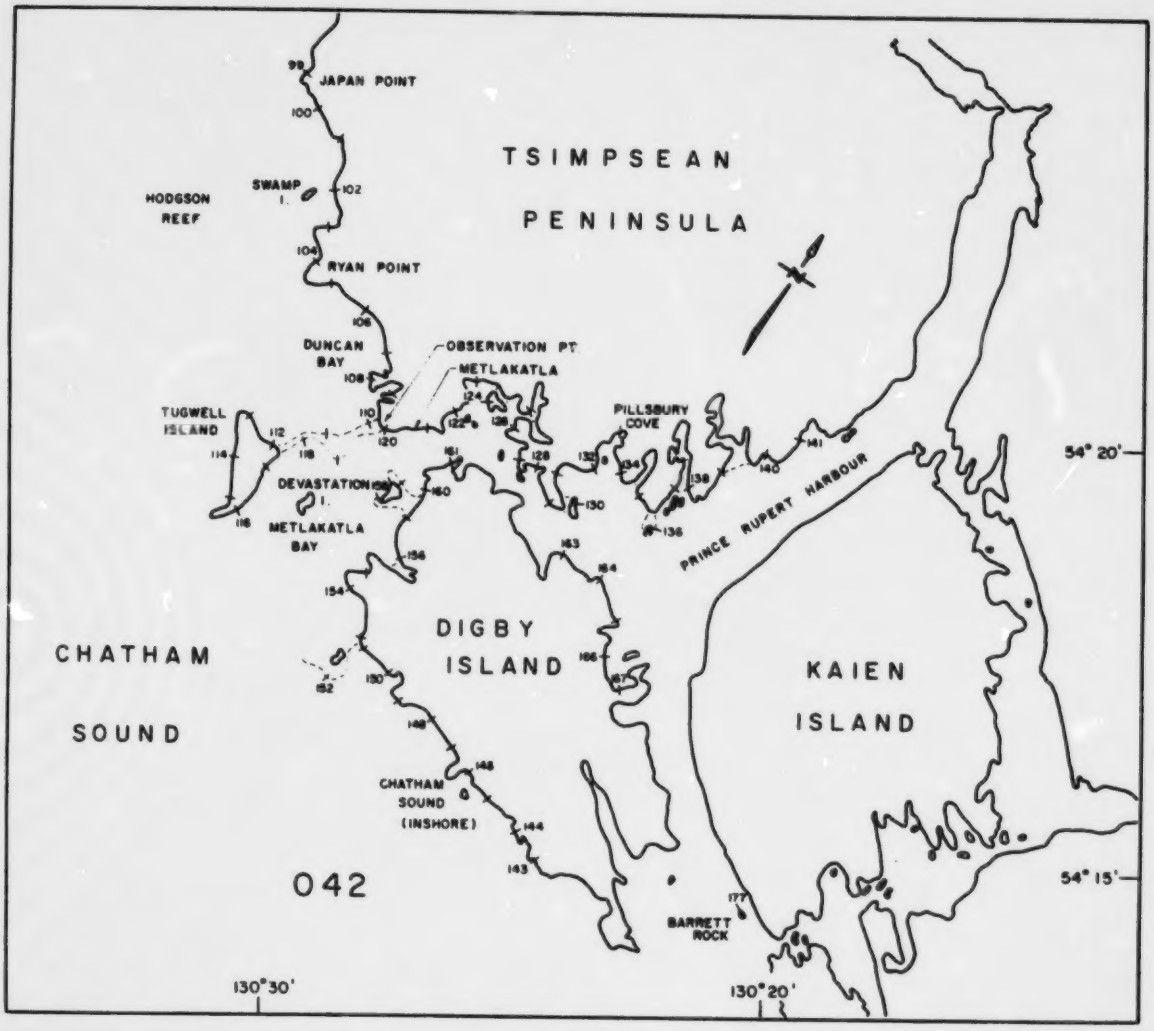

Fig. 042-2. Detailed map of section 042, Big Bay.

Table 042-1. Section 042 - spawn position by year.

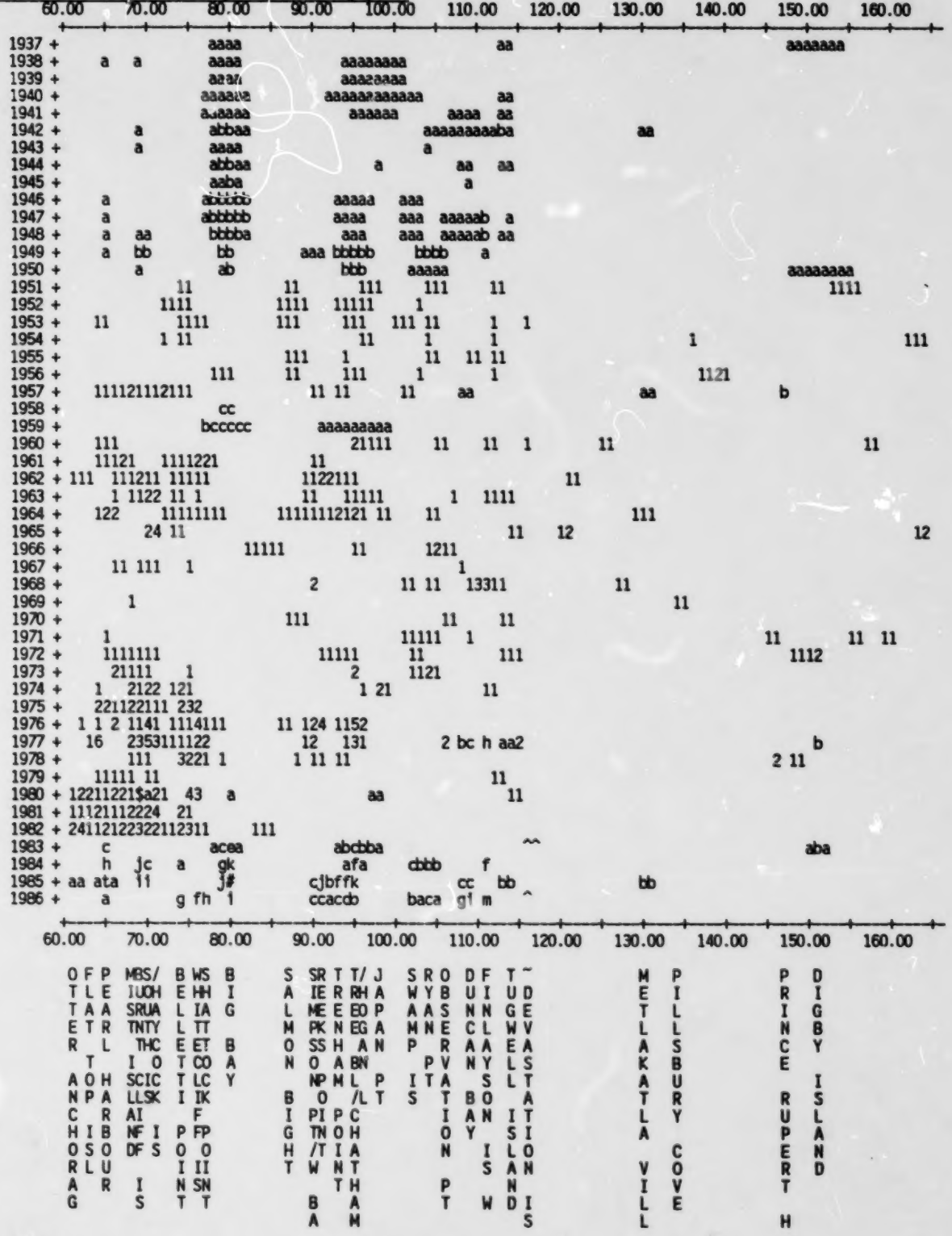

Table 042-2. Section 042 - histogram of cumulative spawn frequency over distance

```
                        position(km)
                              0    5   10   15   20   25   30   35   40   45   50   55   60   65   70   75  vara varb varc  all
                              +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                        59.00 +                                                                                  0    0    0    0
                        60.00 +                                                                                  0    0    0    0
OTTER ANCHORAGE         61.00 +*****0                                                                            5    1    0    6
                        62.00 +*********0                                                                        9    1    0   10
FLAT TOP ISLETS         63.00 +******                                                                            6    0    0    6
                        64.00 +*******************0                                                            20    1    0   21
PEARL HARBOUR           65.00 +***************000000000000000000000000000000000000000000                     15   37    0   52
                        66.00 +*******************0                                                           19    1    0   20
                        67.00 +**************                                                                   14    0    0   14
MIST ISLAND             68.00 +**********************                                                         22    0    0   22
BURNT CLIFF ISLAND      69.00 +*********************00000000000000000000000000000                           21   27    0   48
SOUTH ISLAND/HAYCOCK ISLA 70.00 +****************************000000000000000                                 27   16    0   43
                        71.00 +**************************                                                     26    0    0   26
                        72.00 +**********                                                                       10    0    0   10
                        73.00 +***********                                                                      11    0    0   11
BELLETTI POINT          74.00 +***********************00000000                                               23    8    0   31
                        75.00 +**************************                                                     26    0    0   26
WHITECLIFF ISLAND       76.00 +********************000000                                                     20    6    0   26
SHATTOCK POINT          77.00 +**********00000000000000                                                       10   14    0   24
                        78.00 +****0000000000000000000                                                        4   19    0   23
                        79.00 +****000000000000000000000000000000000000000000000000000                       4   46    0   50
BIG BAY                 80.00 +*0000000000000000000000000000000000000000000000000000000000000000000000000x   1   85    0   86
                        81.00 +00000000000000000000                                                           0   19    0   19
                        82.00 +*000000000000                                                                  1   12    0   13
                        83.00 +**                                                                             2    0    0    2
                        84.00 +**                                                                             2    0    0    2
                        85.00 +**                                                                             2    0    0    2
                        86.00 +*****                                                                          5    0    0    5
SALMON BIGHT            87.00 +********                                                                       8    0    0    8
                        88.00 +********                                                                       8    0    0    8
                        89.00 +********0                                                                      8    1    0    9
SIMPSON POIN/WEST BASE PO 90.00 +************0000000                                                          12    7    0   19
REEKS POINT             91.00 +***********000000000000000                                                     11   15    0   26
                        92.00 +****00000                                                                      4    5    0    9
                              +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                              0    5   10   15   20   25   30   35   40   45   50   55   60   65   70   75  vara varb varc  all
```

Table 042-2 (cont'd.)

	position(km)	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75	vara	varh	varc	all
TRENHAM POINT	93.00	+********0000000000000000	8	16	0	24
	94.00	+************00000000000000000000000000	12	24	0	36
TREE BL/CHATHAM/HOGAN L	95.00	+**********************0000000000000000000000000000000000000000000000000000	21	47	0	68
	96.00	+*************000000000000000	13	15	0	28
	97.00	+******00000000000	5	11	0	16
JAPAN POINT	98.00	+*******00000000	6	8	0	14
	99.00	+****00000	3	5	0	8
	100.00	+*0000	1	4	0	5
	101.00	+*****000000	4	6	0	10
SWAMP ISLAND	102.00	+*******0000000000	6	10	0	16
	103.00	+******0000000000	5	10	0	15
RYAN POINT	104.00	+**********0000000000	10	10	0	20
	105.00	+**********0000000	10	7	0	17
OBSERVATION POINT	106.00	+*******000000	6	6	0	12
	107.00	+****0000	3	4	0	7
	108.00	+*000000000000000000	1	18	0	19
DUNCAN BAY	109.00	+****00000000000000000000	3	22	0	25
	110.00	+*****0000	4	4	0	8
FINLAYSON ISLAND WEST	111.00	+*******0000000000000000000000000000000000	6	33	0	39
	112.00	+**********0	10	1	0	11
	113.00	+********0000000000	7	10	0	17
TUGWELL ISLAND	114.00	+******0000000000	5	10	0	15
	115.00	+******	5	0	0	5
DEVASTATION ISLAND	116.00	+**111	2	0	3	5
	117.00	+1	0	0	1	1
	118.00	+	0	0	0	0
	119.00	+	0	0	0	0
	120.00	+*	1	0	0	1
	121.00	+***	3	0	0	3
	122.00	+*	1	0	0	1
	123.00	+	0	0	0	0
	124.00	+	0	0	0	0
	125.00	+*	1	0	0	1
	126.00	+*	1	0	0	1
	127.00	+*	1	0	0	1
		0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75	vara	varh	varc	all

Table 042-2 (cont'd.)

	position(km) 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75	vara	varb	varc	all
	128.00 +*	1	0	0	1
	129.00 +*	1	0	0	1
METLAKATLA VILLAGE	130.00 +*0000	1	4	0	5
	131.00 +*0000	1	4	0	5
	132.00 +	0	0	0	0
	133.00 +	0	0	0	0
PILLSBURY COVE	134.00 +*	1	0	0	1
	135.00 +*	1	0	0	1
	136.00 +*	1	0	0	1
	137.00 +*	1	0	0	1
	138.00 +*	1	0	0	1
	139.00 +**	2	0	0	2
	140.00 +*	1	0	0	1
	141.00 +	0	0	0	0
	142.00 +	0	0	0	0
	143.00 +	0	0	0	0
	144.00 +	0	0	0	0
	145.00 +*	1	0	0	1
	146.00 +***	3	0	0	3
PRINCE RUPERT HARBOUR	147.00 +00	0	2	0	2
	148.00 +**00	2	2	0	4
	149.00 +**00	2	2	0	4
	150.00 +*000	1	3	0	4
DIGBY ISLAND	151.00 +**000000	2	6	0	8
	152.00 +000	0	3	0	3
	153.00 +*00	1	2	0	3
	154.00 +*00	1	2	0	3
	155.00 +**0	2	1	0	3
	156.00 +**	2	0	0	2
	157.00 +*	1	0	0	1
	158.00 +*	1	0	0	1
	159.00 +*	1	0	0	1
	160.00 +*	1	0	0	1
	161.00 +	0	0	0	0
	162.00 +	0	0	0	0
	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75	vara	varb	varc	all

Table 042-2 (cont'd.)

position(km)

	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75	vara	varb	varc	all
163.00	+*	1	0	0	1
164.00	+**	2	0	0	2
165.00	+***	3	0	0	3
166.00	+	0	0	0	0
167.00	+	0	0	0	0
168.00	+	0	0	0	0
169.00	+	0	0	0	0
170.00	+	0	0	0	0
171.00	+	0	0	0	0
172.00	+	0	0	0	0
173.00	+	0	0	0	0
174.00	+	0	0	0	0
175.00	+	0	0	0	0
176.00	+II	0	0	2	2
BARRET ROCK 177.00	+II	0	0	2	2
178.00	+	0	0	0	0
	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75	vara	varb	varc	all

Table 042-3. Herring statistical spawn summary for section 042.

Year	Total records	Spawn index	Sum length	Av wid	Av int	Av date	SE date	Wt date	Min day	Max day	Ind day	Ind loc
1937	3	498276	10457	0	7.0	83.7	0.88	84.2	82	85	3	3
1938	5	472974	9926	0	7.0	74.6	1.47	76.8	71	77	2	5
1939	2	421607	8848	0	6.0	83.0	1.00	82.5	82	84	2	2
1940	3	843167	17695	0	7.0	80.7	0.33	80.7	80	81	2	3
1941	4	695118	14588	0	7.0	75.8	0.75	76.0	75	78	2	4
1942	6	749106	15721	34	6.0	88.5	3.96	86.3	82	108	5	5
1943	3	162963	3420	37	4.3	83.0	1.15	81.5	81	85	3	3
1944	5	254737	5346	33	7.0	86.6	0.24	86.2	86	87	2	4
1945	3	152432	3199	34	5.7	90.3	1.33	89.2	89	93	2	2
1946	5	711081	14923	33	6.6	77.8	1.80	77.1	76	85	2	4
1947	8	927603	19467	22	5.8	80.3	4.20	74.7	74	104	3	7
1948	9	888434	18645	28	5.4	73.0	2.65	69.5	69	87	2	8
1949	11	948426	19904	34	4.6	79.2	0.12	79.3	79	80	2	7
1950	7	726472	15246	78	4.1	87.1	1.14	89.6	86	94	2	5
1951	7	555694	11662	205	6.1	89.4	0.57	88.9	86	90	2	5
1952	4	445051	9340	36	5.5	98.5	3.50	99.8	95	109	2	3
1953	10	630267	13227	30	6.2	88.8	3.27	82.8	78	108	7	8
1954	7	239537	5027	20	4.1	90.9	5.08	94.3	79	110	3	7
1955	5	284566	5972	23	5.4	89.6	0.40	89.4	88	90	2	3
1956	7	430423	9033	37	4.7	101.7	2.40	102.0	98	111	2	6
1957	10	668482	14029	21	6.0	98.3	2.20	93.9	92	116	4	8
1958	3	108880	2285	11	5.0	84.0	0.00	84.0	84	84	1	1
1959	4	1088803	22850	48	5.5	91.0	0.00	91.0	91	91	1	2
1960	8	409409	8592	65	5.8	97.3	2.92	96.7	92	117	4	6
1961	5	521958	10954	126	3.2	84.0	1.00	85.2	83	88	2	4
1962	9	792658	16635	54	5.0	88.0	1.63	86.9	83	99	4	6
1963	13	535681	11242	140	5.0	95.5	0.72	95.0	91	97	3	5
1964	14	879762	18463	60	5.6	93.9	1.84	93.9	90	116	6	6
1965	12	168300	3532	68	3.3	95.5	0.65	95.6	92	97	3	4
1966	4	348417	7312	92	4.0	100.5	0.87	100.9	99	102	2	4
1967	7	134992	2833	197	4.1	101.3	1.55	101.1	92	103	3	3
1968	10	251354	5275	213	2.8	119.8	1.10	119.7	116	126	6	5
1969	3	34832	731	27	4.3	109.7	4.70	109.9	104	119	3	2
1970	3	215616	4525	42	4.3	102.7	1.33	101.6	100	104	2	2
1971	9	237392	4982	34	3.9	104.2	0.57	103.9	102	106	3	6
1972	9	680442	14280	32	3.4	126.0	10.73	117.9	94	170	6	6
1973	7	328833	6901	42	4.4	113.3	6.09	111.0	97	133	5	6
1974	12	314871	6608	14	3.8	105.2	5.57	100.3	90	140	3	6
1975	12	436903	9169	49	2.9	98.0	0.00	98.0	98	98	1	3
1976	30	480503	10084	46	3.8	97.7	0.33	97.5	95	100	5	12
1977	44	646325	13564	50	2.2	106.7	3.17	101.1	89	156	9	9
1978	18	168109	3528	64	1.7	100.7	6.81	88.9	85	153	3	8
1979	4	213377	4478	84	3.0	100.0	9.00	93.9	91	127	2	3
1980	23	499706	10487	65	2.4	96.2	2.60	99.7	90	129	6	6
1981	16	304912	6399	67	0.0	83.8	0.25	83.6	83	85	2	5
1982	19	816959	17145	61	0.0	89.0	0.00	89.0	89	89	1	7
1983	15	838640	17600	108	0.0	95.1	5.17	93.5	86	142	3	6
1984	51	1093329	22945	89	0.0	88.7	0.22	88.2	85	90	5	9
1985	107	1650167	34631	69	0.0	86.7	0.37	88.3	84	111	10	14
1986	85	1437601	30170	103	0.0	106.5	0.92	105.9	101	141	8	15
All	680	27345146	573875	71	4.2	95.0	0.56	90.5	69	170	62	34

Table 042-4. Spawn summary for section 042 from 1937 to 1986.

A. GENERAL:

There is one major spawning area between Otter Anchorage and Tugwell Island centered at Big Bay and one minor area between Metlakatla and Prince Rupert Harbour.

B. COMPLETENESS OF RECORDS:

The 50 year record should be reasonably complete considering proximity to Prince Rupert and Metlakatla.

C. SPAWNING CONSISTENCY OVER TIME: CONSTANT

If pooled among all localities, there has been a constant annual record of spawnings since 1937.

D. MAGNITUDE OF SPAWNINGS: VERY LARGE

1. NUMBER OF SPAWN YEARS/50 YEARS	= 50/50 (1937-86)
2. NUMBER OF SPAWN YEARS/DOCUMENTED YEARS	= 50/50 (1937-86)
3. CUMULATIVE SPAWN LENGTH	= 573.9 Km.
4. CUMULATIVE SPAWN AREA	= 2734.5 ha.

E. SPAWNING TIME:

1. MEAN UNWEIGHTED DATE (DOY)	= April 5 (95.0)
2. MEAN WEIGHTED DATE (DOY)	= April 1 (90.5)

F. COMMENTS:

The section of coastline in area 042 probably is among the largest in the north coast and is one of the main sites for commercial fisheries. Frequently spawn is continuous between sections 042 and 033 to the north. Surveys of recently hatched larval herring (D.E. Hay, unpub. data) show that larval distributions are continuous throughout sections 033, 042, 043, 044 and 052. Therefore, section 042 appears to be one of the main spawning areas of a large, northern mainland herring population.

G. ROE FISHERIES:

1. NUMBER OF SEINE FISHERY YEARS/15 YEARS	= 2/15 (1972-86)
2. NUMBER OF GILLNET FISHERY YEARS/15 YEARS	= 7/15 (1972-86)
3. MEAN SEINE CATCH/YEAR	= 700 tons
4. MEAN GILLNET CATCH/YEAR	= 1763 tons

Table 042-5. History of roe fishery catches by gear type in Big Bay.

SECT. 042	SEINE NET ROE FISHERIES				GILLNET ROE FISHERIES			
YEAR	DATE OPEN (D/Mo)	TIME OPEN (hrs)	HAILED CATCH (Tons)	FISHING AREA	DATE OPEN (D/Mo)	TIME OPEN (hrs)	HAILED CATCH (Tons)	FISHING AREA
1972	-	-	-	-	-	-	-	-
1973	-	-	-	-	-	-	-	-
1974	24/03-27/03	72	800	Pearl Hbr.	24/03-29/03	120	300	Pearl Hbr.
	07/03-10/03	72	600	Big Bay	07/03-10/03	72	400	Big Bay
1975	-	-	-	-	-	-	-	-
1976	-	-	-	-	31/03	20	365	Big Bay
1977	-	-	-	-	27/03-29/03	50	248	Big Bay
1978	-	-	-	-	-	-	-	-
1979	-	-	-	-	-	-	-	-
1980	-	-	-	-	-	-	-	-
1981	-	-	-	-	-	-	-	-
1982	-	-	-	-	-	-	-	-
1983	-	-	-	-	-	-	-	-
1984	-	-	-	-	26/03-30/03	96	2208	Pearl Hbr. & Big Bay
1985	-	-	-	-	26/03-28/03	46	3813	Pearl Hbr. & Big Bay
1986	-	-	-	-	12/04 & 13/04	12	5010	Big Bay to Duncan Bay

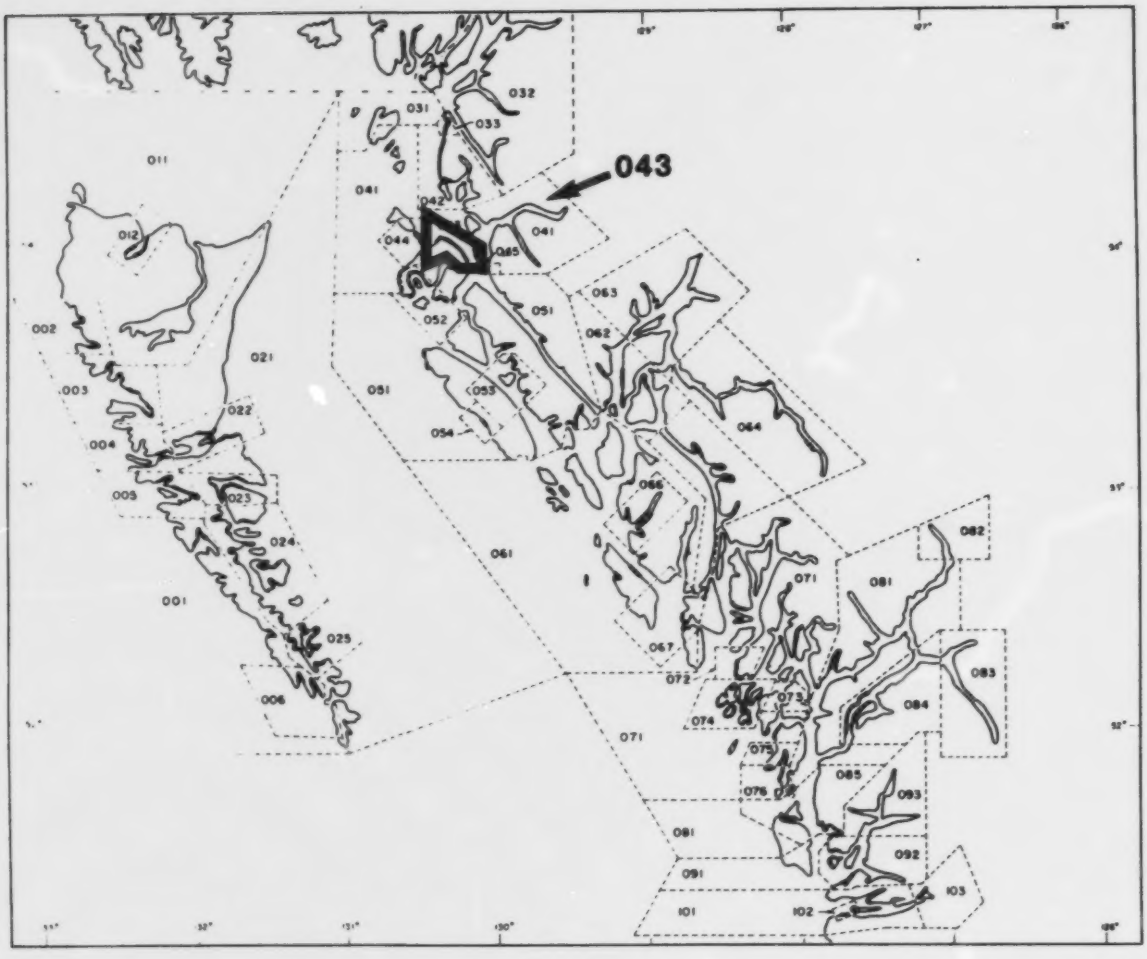

Fig. 043-1. Overview map showing location of section 043, Malacca Passage.

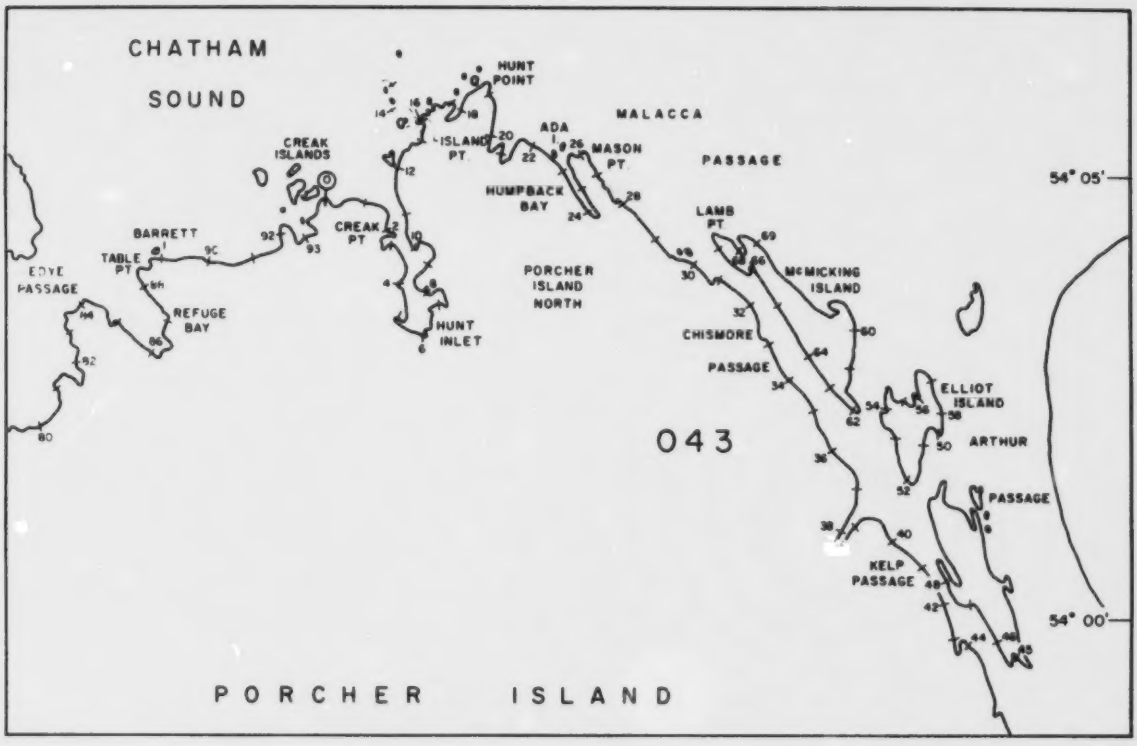

Fig. 043-2. Detailed map of section 043, Malacca Passage.

Table 043-1. Section 043 - spawn position by year.

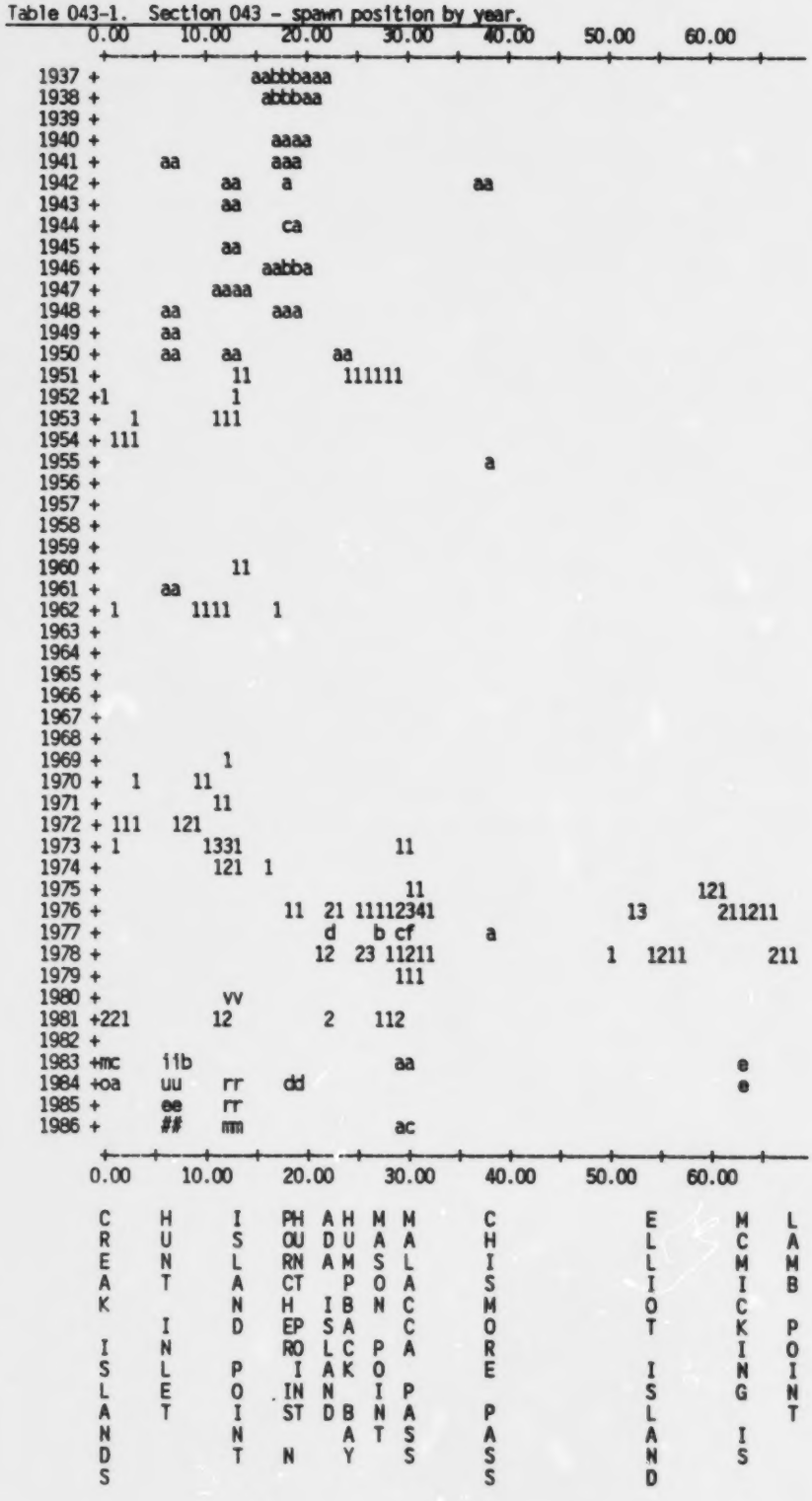

Table 043-2. Section 043 - h'stogram of cumulative spawn frequency over distance

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                        position(km)
                              0    5   10   15   20   25   30   35   40   45   50   55   60   65   70   75  vara varb varc  all
                              +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
CREAK ISLANDS           0.00  +***0000000000000000000000000000000                                                 3   28    0   31
                        1.00  +******0000                                                                        6    4    0   10
                        2.00  +***                                                                               3    0    0    3
                        3.00  +****                                                                              4    0    0    4
                        4.00  +                                                                                 0    0    0    0
                        5.00  +                                                                                 0    0    0    0
HUNT INLET              6.00  +0000000000000000000000000000000000000000000000000000000000000000000000000000  0   67    0   67
                        7.00  +*0000000000000000000000000000000000000000000000000000000000000000000000000000  1   67    0   68
                        8.00  +**00                                                                              2    2    0    4
                        9.00  +***                                                                               3    0    0    3
                       10.00  +***                                                                               3    0    0    3
                       11.00  +********0                                                                         8    1    0    9
                       12.00  +***********000000000000000000000000000000000000000000000000000000000000000000x  11   76    0   87
ISLAND POINT           13.00  +******000000000000000000000000000000000000000000000000000000000000000000000000x   6   76    0   82
                       14.00  +**0                                                                              2    1    0    3
                       15.00  +0                                                                                0    1    0    1
                       16.00  +*000                                                                             1    3    0    4
                       17.00  +*00000000                                                                        1    8    0    9
PORCHER ISLAND NORTH   18.00  +*0000000000000000                                                                1   17    0   18
HUNT POINT             19.00  +*000000000000000                                                                 1   14    0   15
                       20.00  +0000                                                                             0    4    0    4
                       21.00  +*00                                                                             1    2    0    3
ADA ISLAND             22.00  +******00000                                                                      6    5    0   11
                       23.00  +*0                                                                              1    1    0    2
HUMPBACK BAY           24.00  +*0                                                                              1    1    0    2
                       25.00  +****                                                                            4    0    0    4
                       26.00  +*****                                                                           5    0    0    5
MASON POINT            27.00  +***00                                                                           3    2    0    5
                       28.00  +****                                                                            4    0    0    4
                       29.00  +********00000                                                                   8    5    0   13
MALACCA PASS           30.00  +********0000000000                                                              8   10    0   18
                       31.00  +*******                                                                         7    0    0    7
                       32.00  +**                                                                              2    0    0    2
                       33.00  +                                                                                0    0    0    0
                              +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                              0    5   10   15   20   25   30   35   40   45   50   55   60   65   70   75  vara varb varc  all
```

Table 043-2 (cont'd.)

	position(km)																			
		0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	vara	varb	varc	all
	34.00	+																0	0	0	0
	35.00	+																0	0	0	0
	36.00	+																0	0	0	0
	37.00	+0																0	1	0	1
CHISMORE PASSAGE	38.00	+000																0	3	0	3
	39.00	+																0	0	0	0
	40.00	+																0	0	0	0
	41.00	+																0	0	0	0
	42.00	+																0	0	0	0
	43.00	+																0	0	0	0
	44.00	+																0	0	0	0
	45.00	+																0	0	0	0
	46.00	+																0	0	0	0
	47.00	+																0	0	0	0
	48.00	+																0	0	0	0
	49.00	+																0	0	0	0
	50.00	+*																1	0	0	1
	51.00	+																0	0	0	0
	52.00	+*																1	0	0	1
	53.00	+***																3	0	0	3
ELLIOT ISLAND	54.00	+*																1	0	0	1
	55.00	+**																2	0	0	2
	56.00	+*																1	0	0	1
	57.00	+*																1	0	0	1
	58.00	+																0	0	0	0
	59.00	+*																1	0	0	1
	60.00	+**																2	0	0	2
	61.00	+***																3	0	0	3
	62.00	+*																1	0	0	1
MCMICKING ISLAND	63.00	+*0000000000																1	10	0	11
	64.00	+**																2	0	0	2
	65.00	+*																1	0	0	1
	66.00	+***																3	0	0	3
	67.00	+*																1	0	0	1
LAMB POINT	68.00	+*																1	0	0	1
		0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	vara	varb	varc	all

Table 043-2 (cont'd.)

position(km)

	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	vara	varh	varc	all
69.00	+																0	0	0	0
70.00	+																0	0	0	0
71.00	+																0	0	0	0
72.00	+																0	0	0	0
73.00	+																0	0	0	0
74.00	+																0	0	0	0
75.00	+																0	0	0	0
76.00	+																0	0	0	0
77.00	+I																0	0	1	1
78.00	+III																0	0	3	3
79.00	+III																0	0	3	3
80.00	+																0	0	0	0
	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	vara	varh	varc	all

TABLE POINT
BARRETT ISLAND

Table 043-3. Herring statistical spawn summary for section 043.

Year	Total records	Spawn index	Sum length	Av wid	Av int	Av date	SE date	Wt date	Min day	Max day	Ind day	Ind loc
1937	2	187803	8044	0	6.0	87.0	4.00	84.6	83	91	2	2
1938	2	150238	6435	0	6.0	83.0	0.00	83.0	83	83	1	1
1939	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1940	1	75107	3217	0	5.0	94.0	0.00	94.0	94	94	1	1
1941	2	56336	2413	0	5.0	103.5	0.50	103.7	103	104	2	2
1942	3	40554	1737	14	5.7	89.7	0.88	90.1	88	91	3	3
1943	1	21339	914	101	7.0	98.0	0.00	98.0	98	98	1	1
1944	3	19845	850	25	5.7	90.7	3.48	87.5	85	97	3	2
1945	1	1074	46	9	3.0	104.0	0.00	104.0	104	104	1	1
1946	3	112486	4818	6	4.3	90.0	4.00	91.7	82	94	2	2
1947	3	81084	3473	7	3.7	88.0	0.00	88.0	88	88	1	2
1948	2	45877	1965	23	7.0	101.5	0.50	101.9	101	102	2	2
1949	1	42258	1810	9	5.0	96.0	0.00	96.0	96	96	1	1
1950	3	45900	1966	8	5.0	96.0	0.00	96.0	96	96	1	3
1951	3	151312	6481	34	5.0	94.0	0.00	94.0	94	94	1	3
1952	3	66913	2866	18	4.3	97.3	3.33	94.2	94	104	2	3
1953	4	148417	6357	12	6.5	96.3	4.27	92.3	91	109	4	4
1954	1	32009	1371	27	7.0	102.0	0.00	102.0	102	102	1	1
1955	1	1074	46	5	3.0	94.0	0.00	94.0	94	94	1	1
1956	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1957	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1958	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1959	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1960	1	32009	1371	18	5.0	113.0	0.00	113.0	113	113	1	1
1961	1	4273	183	18	5.0	120.0	0.00	120.0	120	120	1	1
1962	4	38826	1663	11	5.0	107.8	2.25	110.6	104	113	3	2
1963	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1964	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1965	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1966	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1967	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1968	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1969	1	6397	274	137	7.0	117.0	0.00	117.0	117	117	1	1
1970	3	28834	1235	27	5.0	104.0	0.00	104.0	104	104	1	1
1971	1	17067	731	18	5.0	123.0	0.00	123.0	123	123	1	1
1972	4	70438	3017	14	5.0	114.0	2.31	112.9	110	118	2	1
1973	7	109894	4707	71	4.7	110.7	3.12	113.8	106	129	4	3
1974	4	17090	732	56	4.0	102.0	0.00	102.0	102	102	1	2
1975	4	45877	1965	6	2.8	117.0	0.00	117.0	117	117	1	1
1976	24	183321	7852	16	3.5	129.2	2.26	128.4	120	142	2	7
1977	20	91380	3914	24	2.2	147.4	1.25	145.7	141	154	3	5
1978	18	209212	8961	8	2.4	124.5	3.77	114.2	107	143	5	5
1979	1	44803	1919	27	3.0	110.0	0.00	110.0	110	110	1	1
1980	22	95022	4070	25	3.2	111.0	0.00	111.0	111	111	1	1
1981	10	212831	9116	124	0.0	103.0	0.82	102.8	101	106	2	7
1982	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1983	29	353707	15150	59	0.0	98.8	2.28	97.3	90	137	5	5
1984	74	384175	16455	24	0.0	102.3	0.81	101.3	98	138	9	7
1985	23	99692	4270	29	0.0	97.3	0.13	97.5	97	99	3	2
1986	43	225532	9660	25	0.0	105.8	0.91	106.6	102	117	3	3
All	333	3550005	152054	30	3.8	108.3	0.87	102.6	82	154	40	20

Table 043-4. Spawn summary for section 043 from 1937 to 1986.

A. GENERAL:

There is one main spawning area between Hunt Inlet and Malacca Pass and secondary locations at Chismore Pass and McMicking Island.

B. COMPLETENESS OF RECORDS:

The 50 year record should be reasonably complete considering proximity to Porcher Island settlement, a former cannery/fishing base, Hunt Inlet and the mouth of the Skeena River.

C. SPAWNING CONSISTENCY OVER TIME: FREQUENT

There have been three spawning episodes, 1937-55, 1960-62 and 1969-86.

D. MAGNITUDE OF SPAWNINGS: MEDIUM

1. NUMBER OF SPAWN YEARS/50 YEARS	= 38/50 (1937-86)
2. NUMBER OF SPAWN YEARS/DOCUMENTED YEARS	= 38/50 (1937-86)
3. CUMULATIVE SPAWN LENGTH	= 152.1 Km.
4. CUMULATIVE SPAWN AREA	= 355.0 ha.

E. SPAWNING TIME:

1. MEAN UNWEIGHTED DATE (DOY)	= April 18 (108.3)
2. MEAN WEIGHTED DATE (DOY)	= April 13 (102.6)

F. COMMENTS:

The northern shore of Porcher Island has a frequent record of spawnings but the location is adjacent to other spawning areas (042 & 044) that also have records of spawnings at approximately the same date. Therefore, spawning in section 043 is part of the spawning from a large, northern stock spawning mainly in sections 042 (Chatham Sound) and 052 Kitkatla Inlet and West Porcher Island).

G. ROE FISHERIES:

No major roe fisheries are documented.

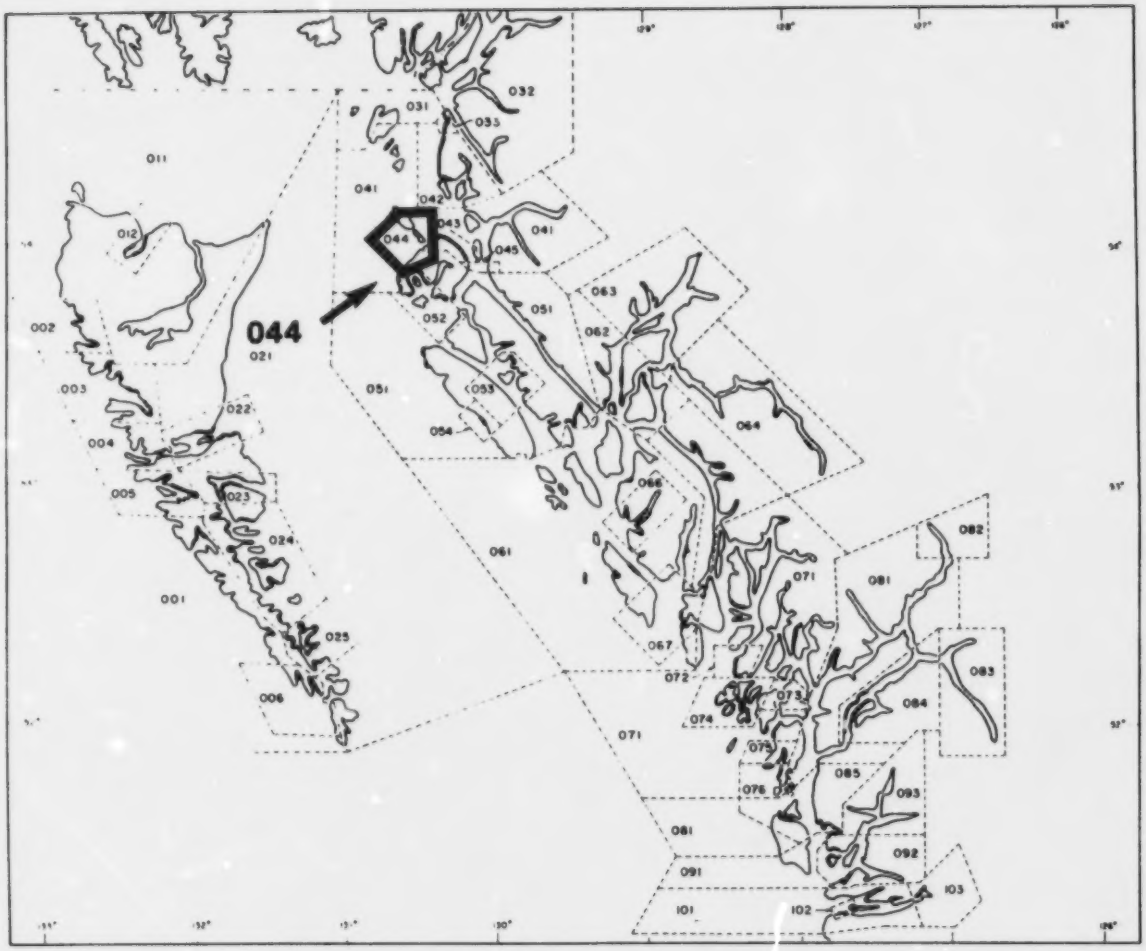


Fig. 044-1. Overview map showing location of section 044, Edye Passage.

Table 044-2. Section 044 - histogram of cumulative spawn frequency over distance

	position(km) 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75	vara	varh	varc	all
	61.00 +	0	0	0	0
	62.00 +|	0	0	2	2
	63.00 +|||||||||||	0	0	10	10
REFUGE BAY	64.00 +|||||||||||	0	0	10	10
	65.00 +|	0	0	2	2
	66.00 +	0	0	0	0
	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75	vara	varh	varc	all

Table 044-3. Herring statistical spawn summary for section 044.

Year	Total records	Spawn index	Sum length	Av wid	Av int	Av date	SE date	Wt date	Min day	Max day	Ind day	Ind loc
1937	1	243511	3217	0	7.0	80.0	0.00	80.0	80	80	1	1
1938	2	487097	6435	0	6.0	79.0	2.00	78.0	77	81	2	2
1939	3	500874	6617	0	5.7	93.7	8.67	97.6	85	111	2	1
1940	1	121793	1609	0	3.0	89.0	0.00	89.0	89	89	1	1
1941	1	30429	402	0	3.0	109.0	0.00	109.0	109	109	1	1
1942	1	20740	274	14	7.0	86.0	0.00	86.0	86	86	1	1
1943	1	1741	23	9	3.0	89.0	0.00	89.0	89	89	1	1
1944	1	103778	1371	18	7.0	87.0	0.00	87.0	87	87	1	1
1945	2	79555	1051	16	7.0	97.5	6.50	98.9	91	104	2	1
1946	2	491109	6488	30	8.0	90.5	3.50	91.0	87	94	2	2
1947	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1948	1	6888	91	9	3.0	105.0	0.00	105.0	105	105	1	1
1949	2	159111	2102	12	4.0	92.5	1.50	93.9	91	94	2	2
1950	1	121793	1609	402	7.0	87.0	0.00	87.0	87	87	1	1
1951	2	58134	768	37	7.0	100.0	4.00	100.2	96	104	2	2
1952	2	132769	1754	30	7.0	94.0	0.00	94.0	94	94	1	1
1953	1	69185	914	27	5.0	92.0	0.00	92.0	92	92	1	1
1954	1	83037	1097	23	7.0	79.0	0.00	79.0	79	79	1	1
1955	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1956	1	3482	46	9	3.0	107.0	0.00	107.0	107	107	1	1
1957	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1958	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1959	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1960	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1961	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1962	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1963	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1964	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1965	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1966	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1967	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1968	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1969	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1970	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1971	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1972	4	235260	3108	57	5.8	121.8	0.25	121.8	121	122	2	1
1973	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1974	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1975	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1976	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1977	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1978	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1979	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1980	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1981	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1982	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1983	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1984	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1985	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1986	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
All	30	2950289	38976	45	5.8	96.2	2.46	91.7	77	122	19	3

Table 044-4. Spawn summary for section 044 from 1937 to 1986.

A. GENERAL:

There is one main spawning area at Refuge Bay.

B. COMPLETENESS OF RECORDS:

Probably all spawning records from 1956 to 1986 are incomplete.

C. SPAWNING CONSISTENCY OVER TIME: CONSTANT

If pooled among all localities, there has been a nearly constant annual record of spawnings from 1937 to 1956 except for the years, 1947 and 1955.

D. MAGNITUDE OF SPAWNINGS: MEDIUM

1. NUMBER OF SPAWN YEARS/50 YEARS	= 19/50 (1937-86)
2. NUMBER OF SPAWN YEARS/DOCUMENTED YEARS	= 18/20 (1937-56)
3. CUMULATIVE SPAWN LENGTH	= 39.0 Km.
4. CUMULATIVE SPAWN AREA	= 295.0 ha.

E. SPAWNING TIME:

1. MEAN UNWEIGHTED DATE (DOY)	= April 6 (96.2)
2. MEAN WEIGHTED DATE (DOY)	= April 2 (91.7)

F. COMMENTS:

The northern shore of Porcher Island has a frequent record of spawnings but the location is adjacent to other spawning areas (042 & 043) that also have records of spawnings at approximately the same date. Therefore, spawning in section 044 appears to be part of the spawning from a large, northern stock spawning mainly in sections 042 (Chatham Sound) and 052 (Kitkatla Inlet and West Porcher Island). There is no detailed map of section 044 but the spawning area of Refuge Bay is located on the detailed map of adjacent section 043.

G. ROE FISHERIES:

No major roe fisheries are documented.

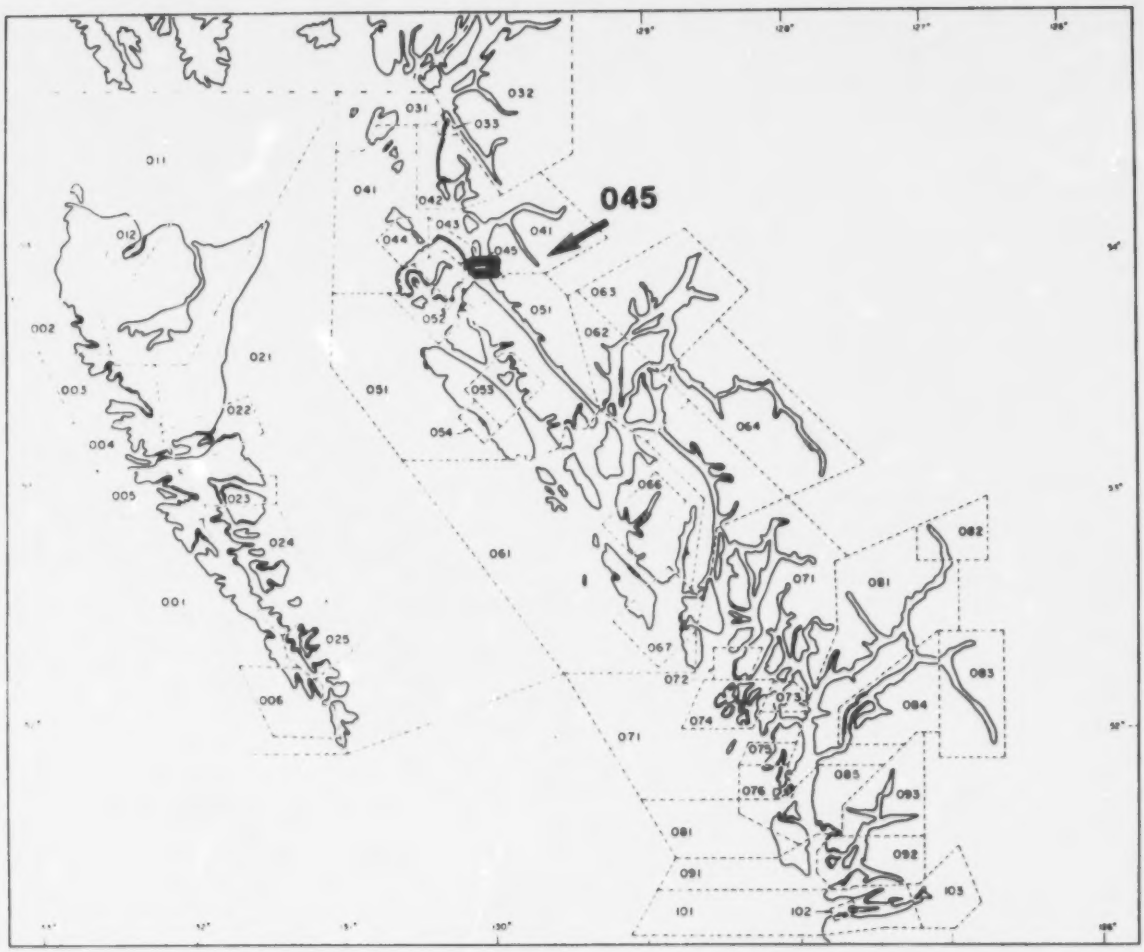


Fig. 045-1. Overview map showing location of section 045, Gibson Group.

Table 045-1. Section 045 - spawn position by year.

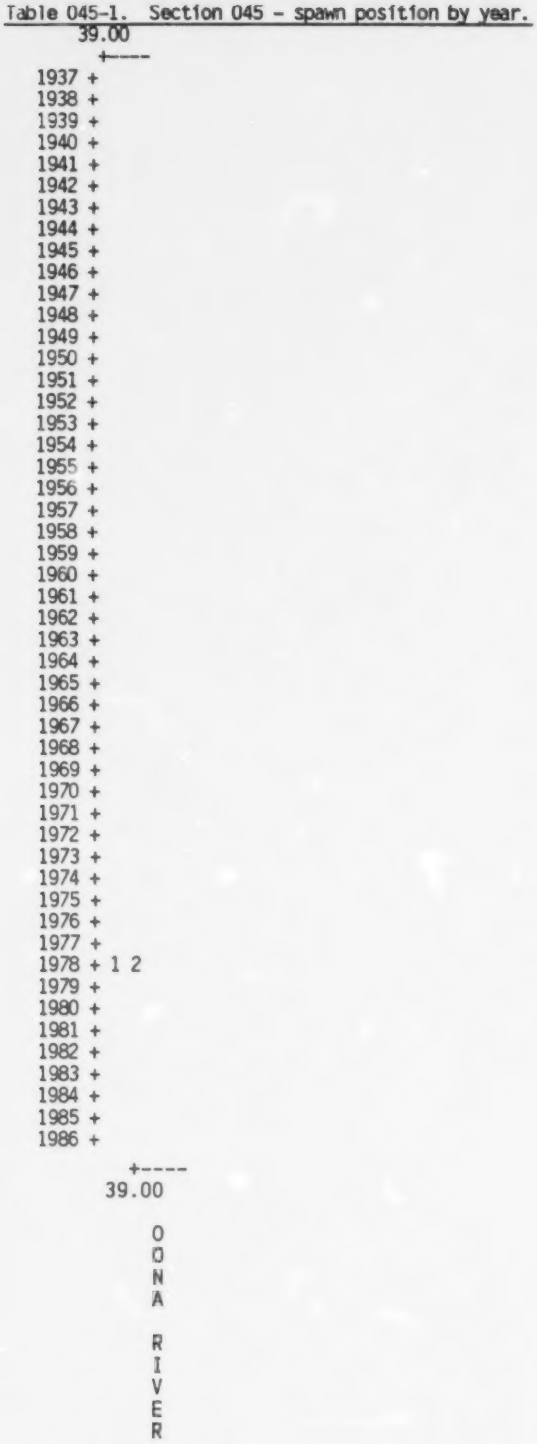


Table 045-2. Section 045 - histogram of cumulative spawn frequency over distance

OONA RIVER

```
position(km)
        0    5   10   15   20   25   30   35   40   45   50   55   60   65   70   75  vara varb varc  all
        +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
38.00   +                                                                               0    0    0    0
39.00   +                                                                               0    0    0    0
40.00   +*                                                                              1    0    0    1
41.00   +                                                                               0    0    0    0
42.00   +**                                                                             2    0    0    2
43.00   +                                                                               0    0    0    0
44.00   +                                                                               0    0    0    0
        +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
        0    5   10   15   20   25   30   35   40   45   50   55   60   65   70   75  vara varb varc  all
```

Table 045-3. Herring statistical spawn summary for section 045.

Year	Total records	Spawn index	Sum length	Av wid	Av int	Av date	SE date	Wt date	Min day	Max day	Ind day	Ind loc
1937	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1938	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1939	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1940	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1941	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1942	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1943	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1944	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1945	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1946	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1947	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1948	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1949	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1950	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1951	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1952	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1953	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1954	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1955	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1956	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1957	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1958	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1959	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1960	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1961	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1962	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1963	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1964	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1965	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1966	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1967	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1968	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1969	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1970	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1971	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1972	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1973	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1974	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1975	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1976	1	24353	2011	9	7.0	151.0	0.00	151.0	151	151	1	1
1977	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1978	3	1538	127	24	2.0	153.0	0.00	153.0	153	153	1	1
1979	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1980	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1981	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1982	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1983	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1984	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1985	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1986	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
All	4	25891	2138	20	3.3	152.5	0.50	151.1	151	153	2	2

Table 045-4. Spawn summary for section 045 from 1937 to 1986.

A. GENERAL:

There is one main spawning area at Oona River.

B. COMPLETENESS OF RECORDS:

The 50 year record should be reasonably complete considering proximity to Oona River settlement and the mouth of the Skeena River.

C. SPAWNING CONSISTENCY OVER TIME: INFREQUENT

There have been only two recorded spawnings, 1976 and 1978.

D. MAGNITUDE OF SPAWNINGS: VERY SMALL

1. NUMBER OF SPAWN YEARS/50 YEARS	= 2/50 (1937-86)
2. NUMBER OF SPAWN YEARS/DOCUMENTED YEARS	= 2/50 (1937-86)
3. CUMULATIVE SPAWN LENGTH	= 2.1 Km.
4. CUMULATIVE SPAWN AREA	= 2.6 ha.

E. SPAWNING TIME:

1. MEAN UNWEIGHTED DATE (DOY)	= June 2 (152.5)
2. MEAN WEIGHTED DATE (DOY)	= May 31 (151.1)

F. COMMENTS:

There are only four records of spawns (1976 and 1978) which occurred 1.5 months later than the mean spawn time of adjacent section 043 (north side of Porcher Island). This suggests a small, resident stock of similar nature to the Massett late spawning stock. There is no detailed map of the spawn positions.

G. ROE FISHERIES:

No major roe fisheries are documented.

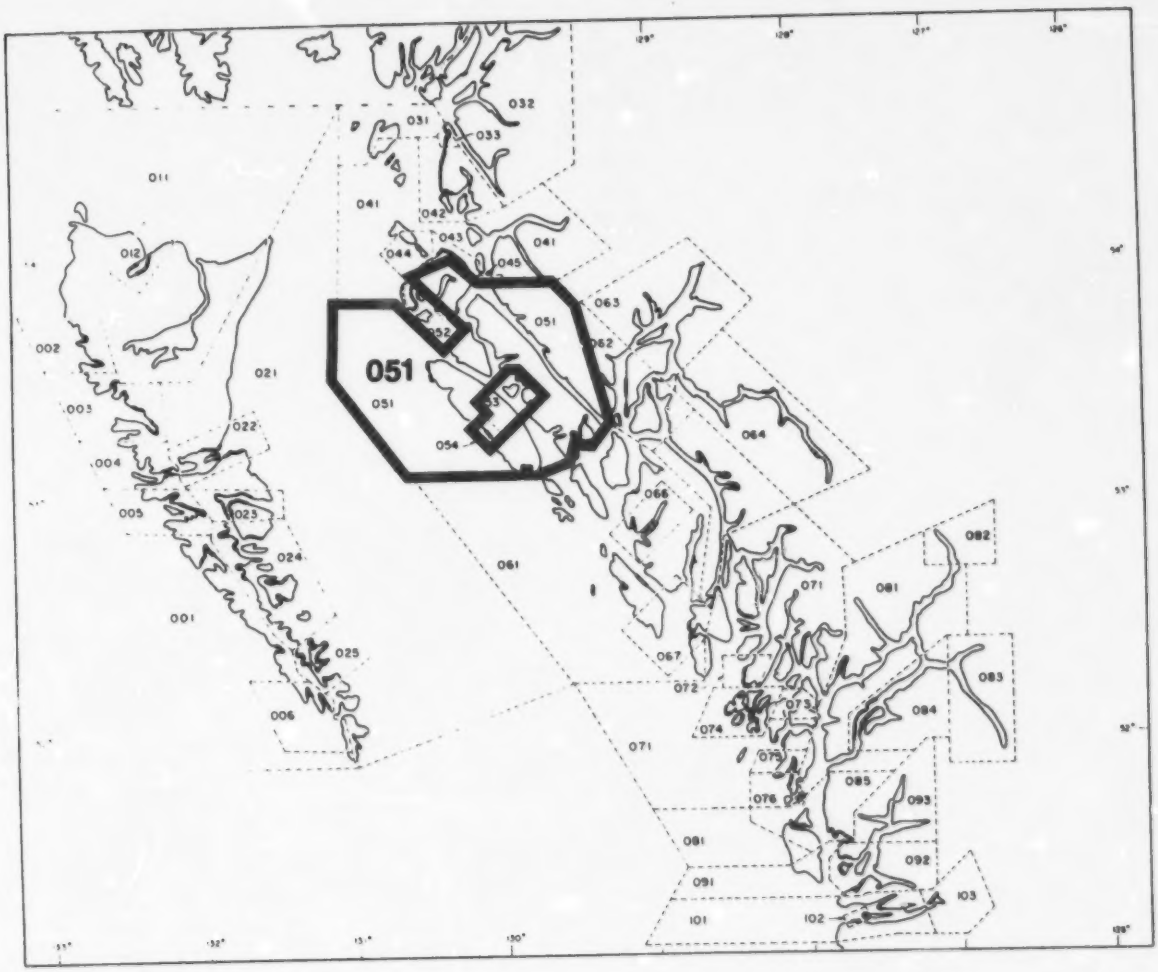


Fig. 051-1. Overview map showing location of section 051, Other Area 5.

Table 051-2. Section 051 - histogram of cumulative spawn frequency over distance

position(km)

		0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	vara	varh	varc	all
	25.00	+																0	0	0	0
	26.00	+ll																0	0	2	2
PORCHER NARROWS	27.00	+ll																0	0	2	?
	28.00	+																0	0	0	0
		0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	vara	varh	varc	all

Table 051-3. Herring statistical spawn summary for section 051.

Year	Total records	Spawn index	Sum length	Av wid	Av int	Av date	SE date	Wt date	Min day	Max day	Ind day	Ind loc
1937	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1938	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1939	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1940	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1941	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1942	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1943	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1944	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1945	4	149735	4022	20	8.0	90.3	0.25	90.2	90	91	2	2
1946	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1947	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1948	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1949	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1950	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1951	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1952	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1953	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1954	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1955	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1956	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1957	2	204164	5484	9	6.0	143.0	0.00	143.0	143	143	1	1
1958	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1959	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1960	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1961	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1962	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1963	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1964	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1965	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1966	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1967	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1968	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1969	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1970	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1971	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1972	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1973	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1974	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1975	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1976	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1977	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1978	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1979	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1980	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1981	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1982	2	7483	201	32	4.5	82.0	0.00	82.0	82	82	1	1
1983	8	16530	444	29	0.0	84.0	0.00	84.0	84	84	1	3
1984	2	13030	350	10	0.0	124.0	0.00	124.0	124	124	1	1
1985	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1986	9	80973	2175	53	0.0	116.0	0.00	116.0	116	116	1	1
All	27	471915	12676	33	6.6	102.8	3.78	118.1	82	143	7	9

Table 051-4. Spawn summary for section 051 from 1937 to 1986.

A. GENERAL:

There are two main spawning areas in this section:
(i) Ogden Channel and
(ii) Rawlinson Harbour

B. COMPLETENESS OF RECORDS:

The 50 year record should be reasonably complete.

C. SPAWNING CONSISTENCY OVER TIME: INFREQUENT

There have been three main spawning episodes, 1945, 1957 and 1982-86.

D. MAGNITUDE OF SPAWNINGS: VERY SMALL

1. NUMBER OF SPAWN YEARS/50 YEARS	= 6/50 (1937-86)
2. NUMBER OF SPAWN YEARS/DOCUMENTED YEARS	= 6/50 (1937-86)
3. CUMULATIVE SPAWN LENGTH	= 12.7 Km.
4. CUMULATIVE SPAWN AREA	= 47.2 ha.

E. SPAWNING TIME:

1. MEAN UNWEIGHED DATE (DOY)	= April 13 (102.8)
2. MEAN WEIGHTED DATE (DOY)	= April 28 (118.1)

F. COMMENTS:

Only 27 spawning records were recorded in section 051. They were mainly incidental, occurring in Ogden Channel and Rawlinson Harbour. There is no positional data available for these records, so a detailed map, plot and histogram are not available.

G. ROE FISHERIES:

No major roe fisheries are documented.

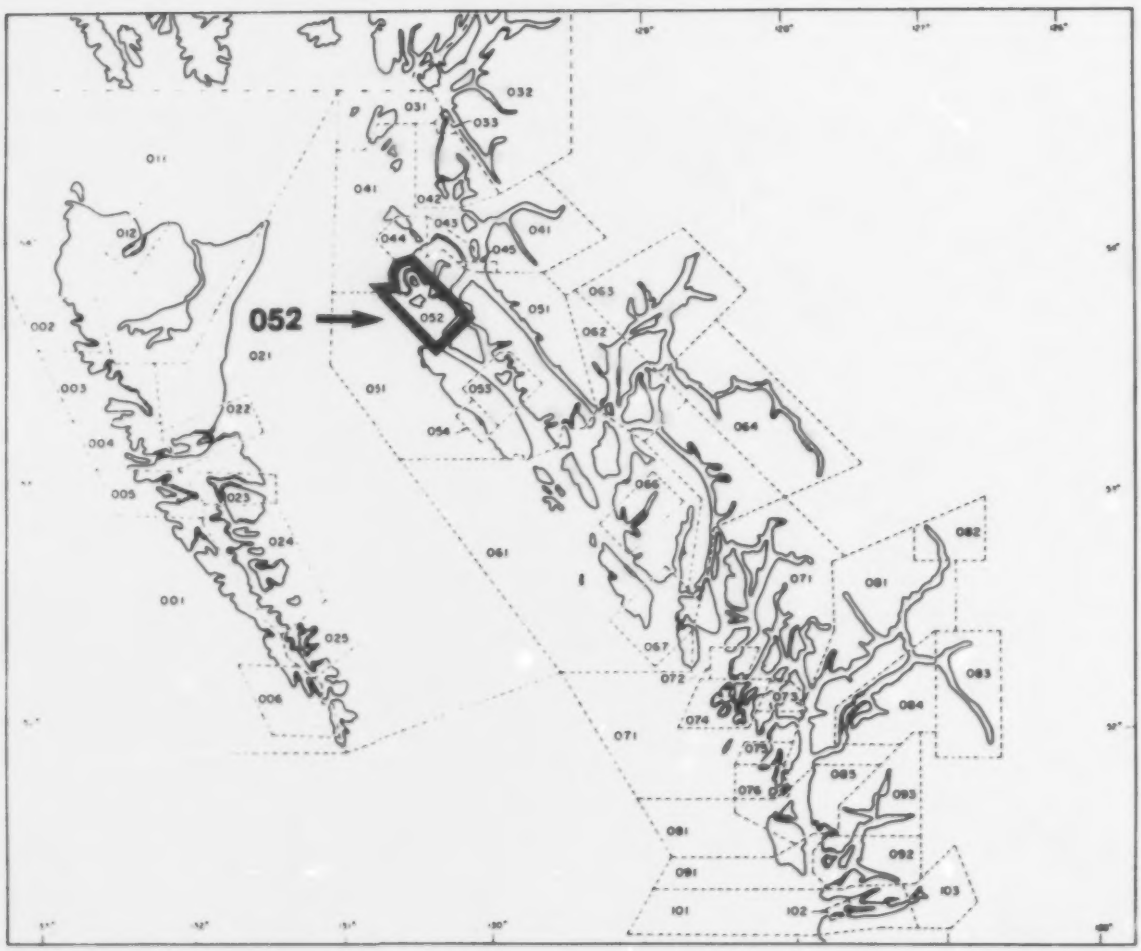


Fig. 052-1. Overview map showing location of section 052, Kitkatla Channel.

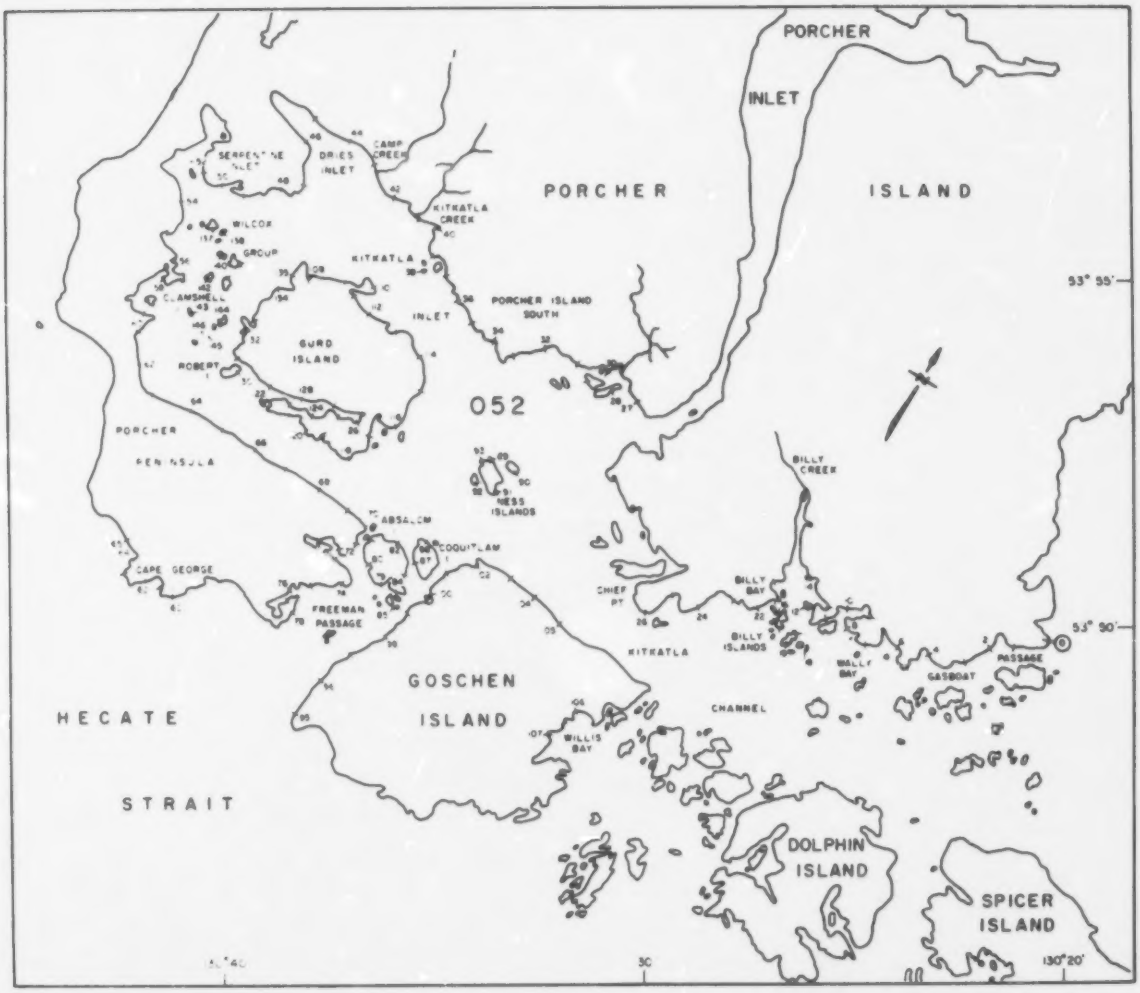


Fig. 052-2. Detailed map of section 052, Kitkatla Channel.

Table 052-1. Section 052 - spawn position by year.

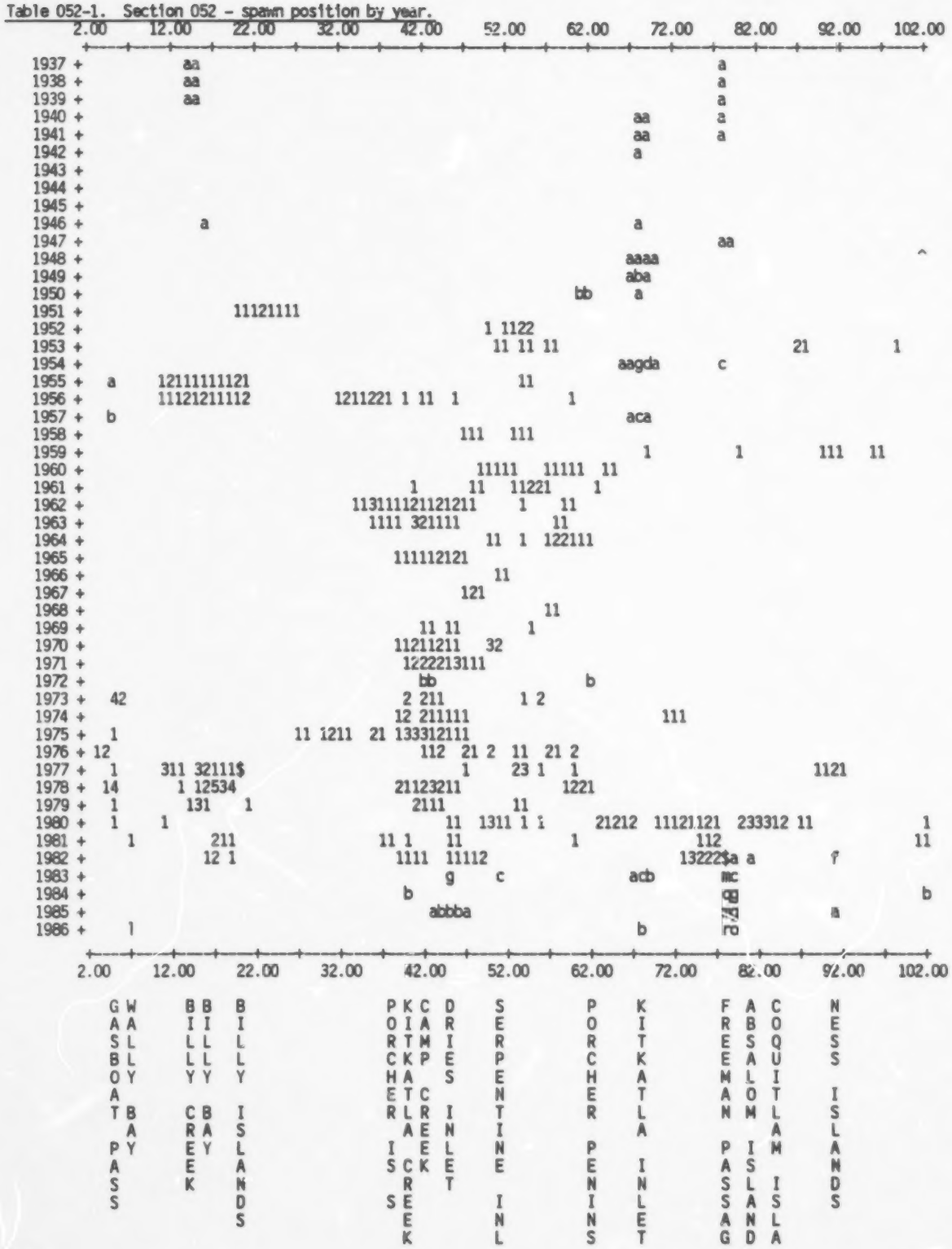


Table 052-1 (cont'd). Section 052 - spawn position by year.

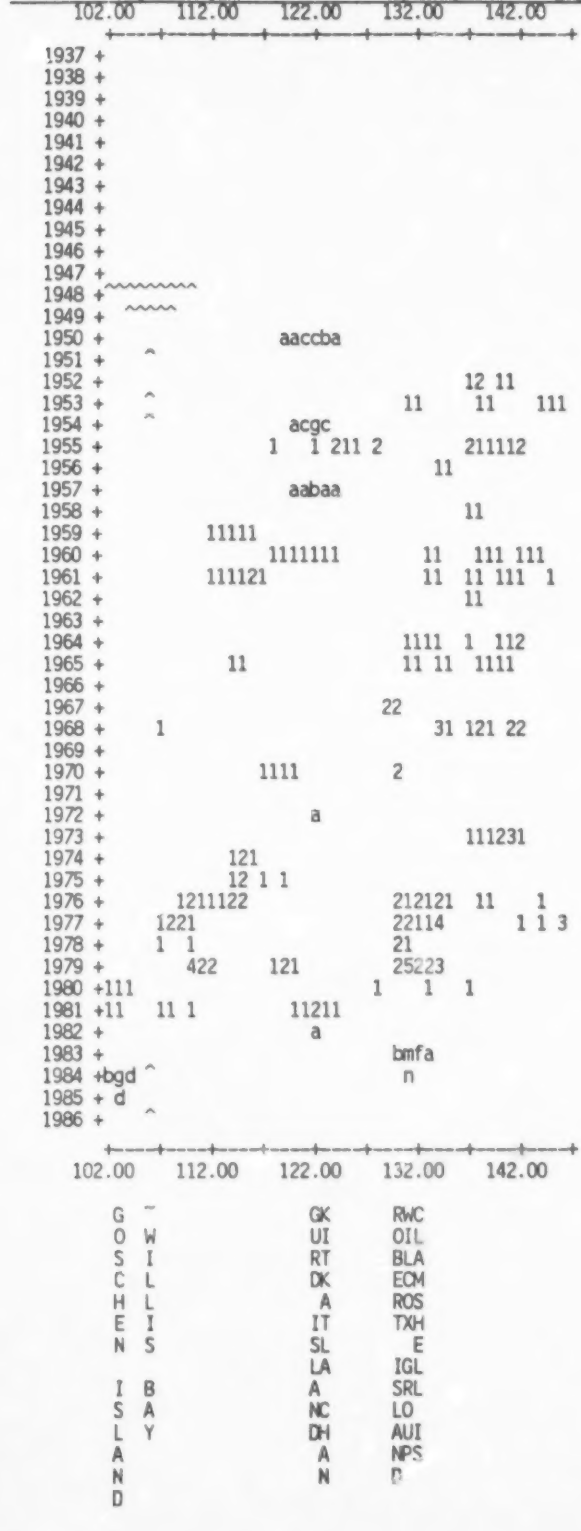
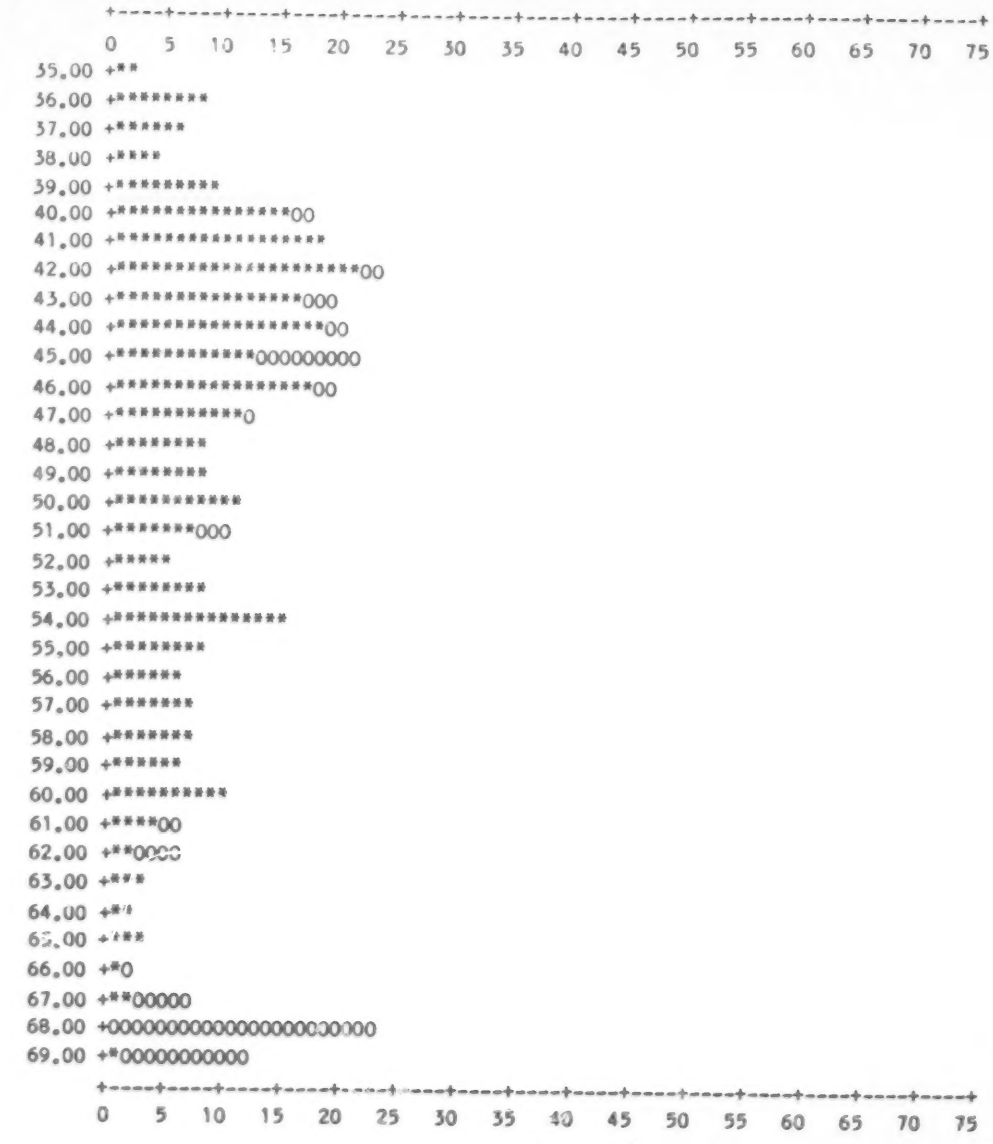


Table 052-2. Section 052 - histogram of cumulative spawn frequency over distance

```
                    position(km)
                          0    5   10   15   20   25   30   35   40   45   50   55   60   65   70   75  vara varb varc  all
                          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                    1.00  +                                                                               0    0    0    0
                    2.00  +                                                                               0    0    0    0
                    3.00  +*                                                                              1    0    0    1
                    4.00  +***                                                                            3    0    0    3
GASBOAT PASSAGE     5.00  +************000                                                               12    3    0   15
                    6.00  +**                                                                            2    0    0    2
WALLY BAY           7.00  +*000000000000                                                                 1   12    0   13
                    8.00  +                                                                               0    0    0    0
                    9.00  +                                                                               0    0    0    0
                   10.00  +                                                                               0    0    0    0
                   11.00  +******                                                                        6    0    0    6
                   12.00  +****                                                                          4    0    0    4
                   13.00  +****                                                                          4    0    0    4
BILLY CREEK        14.00  +****000                                                                       4    3    0    7
                   15.00  +*********000                                                                  9    3    0   12
BILLY BAY          16.00  +*********0                                                                    9    1    0   10
                   17.00  +************                                                                  12    0    0   12
                   18.00  +*******                                                                       7    0    0    7
                   19.00  +*********                                                                     9    0    0    9
BILLY ISLANDS      20.00  +******0000                                                                    6    4    0   10
                   21.00  +*****                                                                         5    0    0    5
                   22.00  +*                                                                            1    0    0    1
                   23.00  +**                                                                           2    0    0    2
                   24.00  +*                                                                            1    0    0    1
                   25.00  +*                                                                            1    0    0    1
                   26.00  +*                                                                            1    0    0    1
                   27.00  +**                                                                           2    0    0    2
                   28.00  +*                                                                            1    0    0    1
                   29.00  +                                                                             0    0    0    0
                   30.00  +*                                                                            1    0    0    1
                   31.00  +**                                                                           2    0    0    2
                   32.00  +**                                                                           2    0    0    2
                   33.00  +***                                                                          3    0    0    3
                   34.00  +**                                                                           2    0    0    2
                          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                          0    5   10   15   20   25   30   35   40   45   50   55   60   65   70   75  vara varb varc  all
```

Table 052-2 (cont'd.)

position(km)



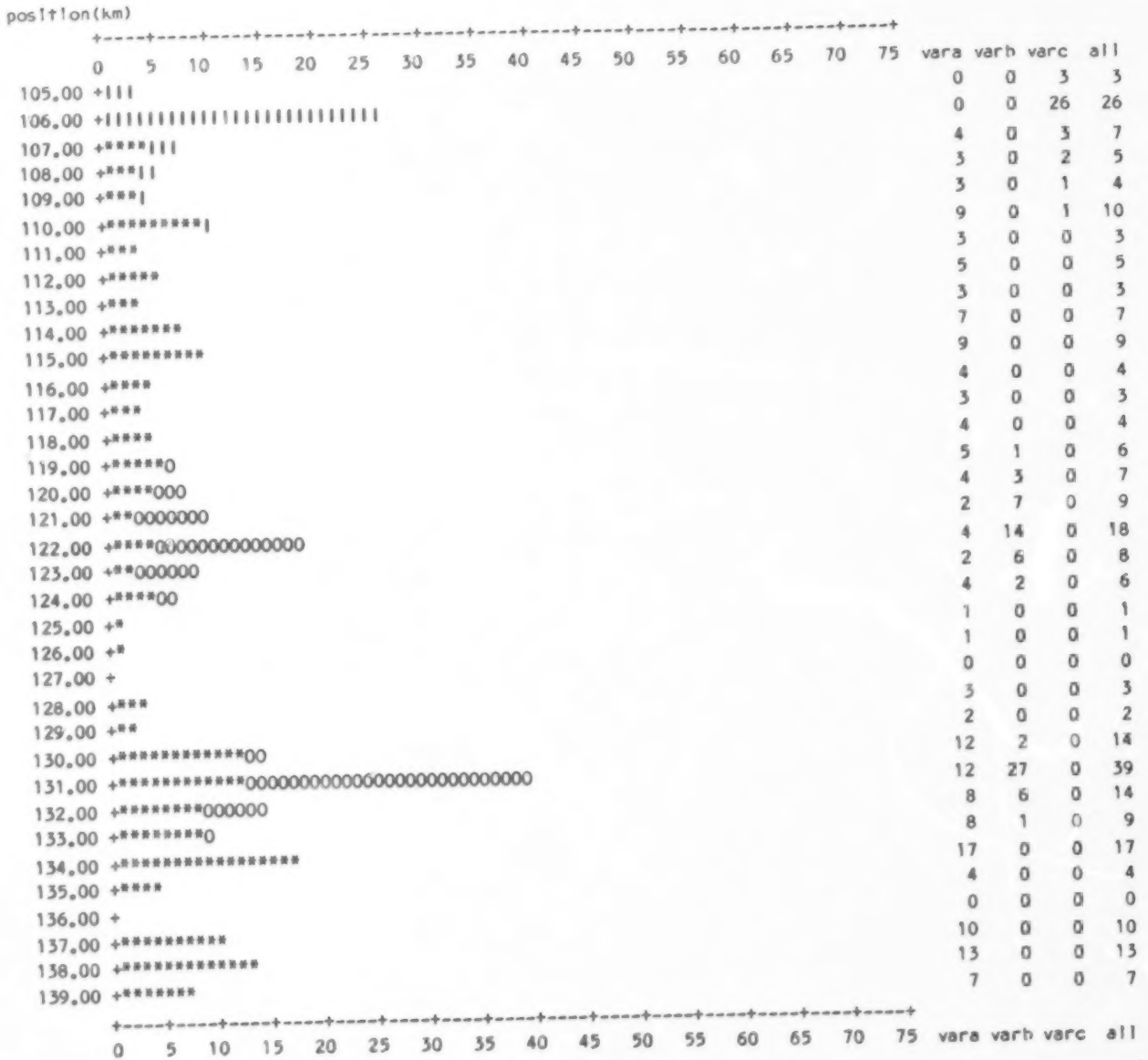
	vara	varb	varc	all
35.00	2	0	0	2
36.00	8	0	0	8
37.00	6	0	0	6
38.00	4	0	0	4
39.00	9	0	0	9
40.00	15	2	0	17
41.00	18	0	0	18
42.00	21	2	0	23
43.00	16	3	0	19
44.00	18	2	0	20
45.00	12	9	0	21
46.00	17	2	0	19
47.00	11	1	0	12
48.00	8	0	0	8
49.00	8	0	0	8
50.00	11	0	0	11
51.00	7	3	0	10
52.00	5	0	0	5
53.00	8	0	0	8
54.00	15	0	0	15
55.00	8	0	0	8
56.00	6	0	0	6
57.00	7	0	0	7
58.00	7	0	0	7
59.00	6	0	0	6
60.00	10	0	0	10
61.00	4	2	0	6
62.00	2	4	0	6
63.00	3	0	0	3
64.00	2	0	0	2
65.00	3	0	0	3
66.00	1	1	0	2
67.00	2	5	0	7
68.00	0	23	0	23
69.00	1	11	0	12
	vara	varb	varc	all

Table 052-2 (cont'd.)

position(km)

		0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75	vara	varb	varc	all
	70.00	+*00	1	2	0	3
	71.00	+**	2	0	0	2
	72.00	+**	2	0	0	2
	73.00	+****	4	0	0	4
	74.00	+****	4	0	0	4
	75.00	+****	4	0	0	4
	76.00	+*****	5	0	0	5
	77.00	+*****	5	0	0	5
FREEMAN PASSAGE	78.00	+*0000000000

Table 052-2 (cont'd.)



vara	varb	varc	all
0	0	3	3
0	0	26	26
4	0	3	7
3	0	2	5
3	0	1	4
9	0	1	10
3	0	0	3
5	0	0	5
3	0	0	3
7	0	0	7
9	0	0	9
4	0	0	4
3	0	0	3
4	0	0	4
5	1	0	6
4	3	0	7
2	7	0	9
4	14	0	18
2	6	0	8
4	2	0	6
1	0	0	1
1	0	0	1
0	0	0	0
3	0	0	3
2	0	0	2
12	2	0	14
12	27	0	39
8	6	0	14
8	1	0	9
17	0	0	17
4	0	0	4
0	0	0	0
10	0	0	10
13	0	0	13
7	0	0	7
vara	varb	varc	all

Table 052-2 (cont'd.)

position(km)

		0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	vara	varb	varc	all
	140.00	+	********															8	0	0	8
	141.00	+	**********															10	0	0	10
	142.00	+	**********															10	0	0	10
	143.00	+	*															1	0	0	1
	144.00	+	****															4	0	0	4
	145.00	+	**															2	0	0	2
	146.00	+	****															4	0	0	4
	147.00	+																0	0	0	0
	148.00	+																0	0	0	0
	149.00	+																0	0	0	0
	150.00	+																0	0	0	0
	151.00	+																0	0	0	0
	152.00	+																0	0	0	0
	153.00	+																0	0	0	0
	154.00	+																0	0	0	0
	155.00	+																0	0	0	0
	156.00	+																0	0	0	0
	157.00	+																0	0	0	0
	158.00	+																0	0	0	0
	159.00	+																0	0	0	0
	160.00	+																0	0	0	0
	161.00	+																0	0	0	0
	162.00	+	III															0	0	3	3
CAPE GEORGE	163.00	+	III															0	0	3	3
	164.00	+																0	0	0	0
		0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	vara	varb	varc	all

Table 052-3. Herring statistical spawn summary for section 052.

Year	Total records	Spawn index	Sum length	Av wid	Av int	Av date	SE date	Wt date	Min day	Max day	Ind day	Ind loc
1937	3	58652	1791	0	5.7	84.0	0.00	95.0	84	84	1	3
1938	3	58652	1791	0	6.3	79.0	0.00	79.0	79	79	1	3
1939	3	58652	1791	0	4.3	74.0	0.00	74.0	74	74	1	3
1940	3	58652	1791	0	4.0	75.0	0.00	79.0	75	75	1	3
1941	3	58652	1791	0	5.0	74.0	0.00	74.0	74	74	1	3
1942	1	23939	731	0	3.0	84.0	0.00	84.0	84	84	1	1
1943	1	0	0	0	1.0	104.0	0.00	0.0	104	104	1	1
1944	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1945	2	35925	1097	15	5.0	91.0	0.00	91.0	91	91	1	2
1946	2	14245	435	30	5.0	93.5	0.50	93.8	93	94	2	2
1947	1	50890	1554	5	3.0	98.0	0.00	98.0	98	98	1	1
1948	2	335012	10230	6	5.0	95.0	0.00	95.0	95	95	1	2
1949	4	250260	7642	15	6.0	92.0	0.00	92.0	92	92	1	2
1950	8	523510	15986	13	5.3	98.4	2.58	98.9	86	113	5	4
1951	5	257399	7860	32	6.6	93.8	4.16	88.5	87	104	2	2
1952	9	53838	1644	27	4.7	95.3	0.85	96.1	91	97	4	1
1953	16	176937	5403	19	4.4	99.4	1.52	99.2	90	109	10	3
1954	18	529142	16158	20	5.3	89.9	1.54	91.3	84	112	8	4
1955	18	451038	13773	14	4.9	98.6	2.27	91.2	90	110	4	4
1956	16	473831	14469	60	5.3	98.1	0.68	97.5	95	102	5	4
1957	7	249933	7632	9	4.7	98.3	0.89	97.8	94	100	3	3
1958	3	157911	4822	18	3.0	92.0	0.00	92.0	92	92	1	1
1959	5	271808	8300	16	4.0	108.0	3.07	102.6	100	113	3	5
1960	7	599256	18299	16	4.4	94.0	0.76	93.5	92	97	5	4
1961	14	367989	11237	44	5.1	105.6	0.97	102.6	99	109	7	6
1962	11	462435	14121	40	4.5	99.0	2.77	98.2	92	118	7	4
1963	8	293357	8958	71	4.5	92.4	1.43	92.4	89	102	5	5
1964	11	338221	10328	39	3.9	98.0	0.00	98.0	98	98	1	5
1965	9	348701	10648	37	4.2	105.3	1.39	104.3	100	110	3	7
1966	1	8973	274	5	1.0	105.0	0.00	105.0	105	105	1	1
1967	4	85276	2604	7	3.0	102.5	3.28	101.0	95	111	3	2
1968	13	109247	3336	10	3.2	101.2	2.05	103.5	92	111	9	3
1969	3	31438	960	10	3.3	85.3	2.33	83.3	83	90	2	2
1970	11	306456	9358	47	3.5	95.3	2.92	102.6	83	104	4	4
1971	9	241549	7376	35	3.4	117.9	2.24	119.8	100	121	3	3
1972	5	63466	1938	44	4.4	113.0	5.31	120.7	100	122	3	3
1973	20	194687	5945	59	3.7	108.2	2.83	103.4	100	127	3	7
1974	11	236506	7222	94	3.7	117.8	0.76	117.8	116	121	2	6
1975	23	349552	10674	51	5.1	117.0	1.00	115.6	114	137	5	6
1976	31	398772	12177	37	4.3	103.3	1.24	102.0	92	123	7	9
1977	44	628107	19180	29	3.5	113.4	1.74	115.3	87	159	12	11
1978	39	333473	10183	46	3.2	105.4	1.91	99.9	87	128	10	9
1979	32	263032	8032	70	5.7	101.6	1.48	99.3	85	111	6	8
1980	35	718557	21942	36	4.4	96.2	1.05	95.0	92	123	8	11
1981	17	420517	12841	28	0.0	103.5	3.66	102.3	78	119	6	8
1982	33	333735	10191	25	0.0	93.1	1.70	89.8	75	108	9	10
1983	49	515486	15741	78	0.0	96.3	1.58	92.1	73	115	9	7
1984	47	496623	15165	33	0.0	90.6	2.62	94.4	66	106	5	5
1985	29	442425	13510	46	0.0	95.0	1.13	88.6	77	99	4	7
1986	69	488764	14925	31	0.0	105.6	0.53	104.7	103	115	3	6
All	718	13225478	403856	40	4.3	100.8	0.45	98.6	66	159	51	31

Table 052-4. Spawn summary for section 052 from 1937 to 1986.

A. GENERAL:

There are three main spawning areas in this section:
(i) Kitkatla Inlet-Gurd Island
(ii) Freeman Pass and
(iii) Gasboat Pass to Billy Bay

B. COMPLETENESS OF RECORDS:

Probably all spawning records prior to 1945 are incomplete.

C. SPAWNING CONSISTENCY OVER TIME: CONSTANT

If pooled among all localities, there has been a constant annual record of spawnings since 1945.

D. MAGNITUDE OF SPAWNINGS: LARGE

1. NUMBER OF SPAWN YEARS/50 YEARS	= 49/50 (1937-86)
2. NUMBER OF SPAWN YEARS/DOCUMENTED YEARS	= 42/42 (1945-86)
3. CUMULATIVE SPAWN LENGTH	= 403.9 Km.
4. CUMULATIVE SPAWN AREA	= 1322.6 ha.

E. SPAWNING TIME:

1. MEAN UNWEIGHTED DATE (DOY)	= April 11 (100.8)
2. MEAN WEIGHTED DATE (DOY)	= April 10 (98.6)

F. COMMENTS:

There has been virtually continuous spawning in this area since records started in 1937. In recent years there are about 50 separate spawning records per year with a mean time of April 11. Although Kitkatla Inlet frequently is listed as a separate stock it could simply be the southern edge of a larger northern stock extending from Port Simpson to Principe Channel. The main evidence for this suggestion is that only one winter holding area has been identified for the entire region (Browning Entrance). Also, preliminary results indicated that there is a continuous larval distribution in nearshore waters throughout the entire range. This would indicate a single larval retention area.

G. ROE FISHERIES:

1. NUMBER OF SEINE FISHERY YEARS/15 YEARS	= 11/15 (1972-86)
2. NUMBER OF GILLNET FISHERY YEARS/15 YEARS	= 8/15 (1972-86)
3. MEAN SEINE CATCH/YEAR	= 1843 tons
4. MEAN GILLNET CATCH/YEAR	= 737 tons

Table 052-5. History of roe fishery catches by gear type in Kitkatla Channel.

SECT. 052	SEINE NET ROE FISHERIES				GILLNET ROE FISHERIES			
YEAR	DATE OPEN (D/Mo)	TIME OPEN (hrs)	HAILED CATCH (Tons)	FISHING AREA	DATE OPEN (D/Mo)	TIME OPEN (hrs)	HAILED CATCH (Tons)	FISHING AREA
1972	26/03-01/04	144	(5729)	Kitkatla & Port Simpson	-	-	-	-
1973	-	-	-	-	-	-	-	-
1974	-	-	-	-	17/03-01/04	360	680	sect. 052
1975	27/03-05/04	216	1865	sect. 052	27/03-05/04	216	12	sect. 052
1976	29/03-30/03	-	2495	sect. 052	29/03-30/03	-	5	sect. 052
1977	27/03	0.3	898	Kitkatla Inlet	27/03-28/03	20	725	Serpentine Inlet
1978	30/03	1.4	475	Dries Inlet	30/03-31/03	24	1500	Dries Inlet
1979	29/03	1.0	1450	Kitkatla Inlet	28/03-01/04	71	1363	Kitkatla Inlet
1980	29/03-31/03	11	1600	Kitkatla Inlet	29/03-31/03	48	1200	Kitkatla Inlet
1981	27/03	1.4	1200	Kitkatla Inlet	30/03-03/04	101	410	Kitkatla Inlet
1982	-	-	-	-	-	-	-	-
1983	-	-	-	-	-	-	-	-
1984	21/03	1.8	1835	Kitkatla Inlet	-	-	-	-
1985	28/03	2.8	3007	Kitkatla Inlet	-	-	-	-
1986	02/04 & 04/04	5.3	3606	Kitkatla Inlet	-	-	-	-

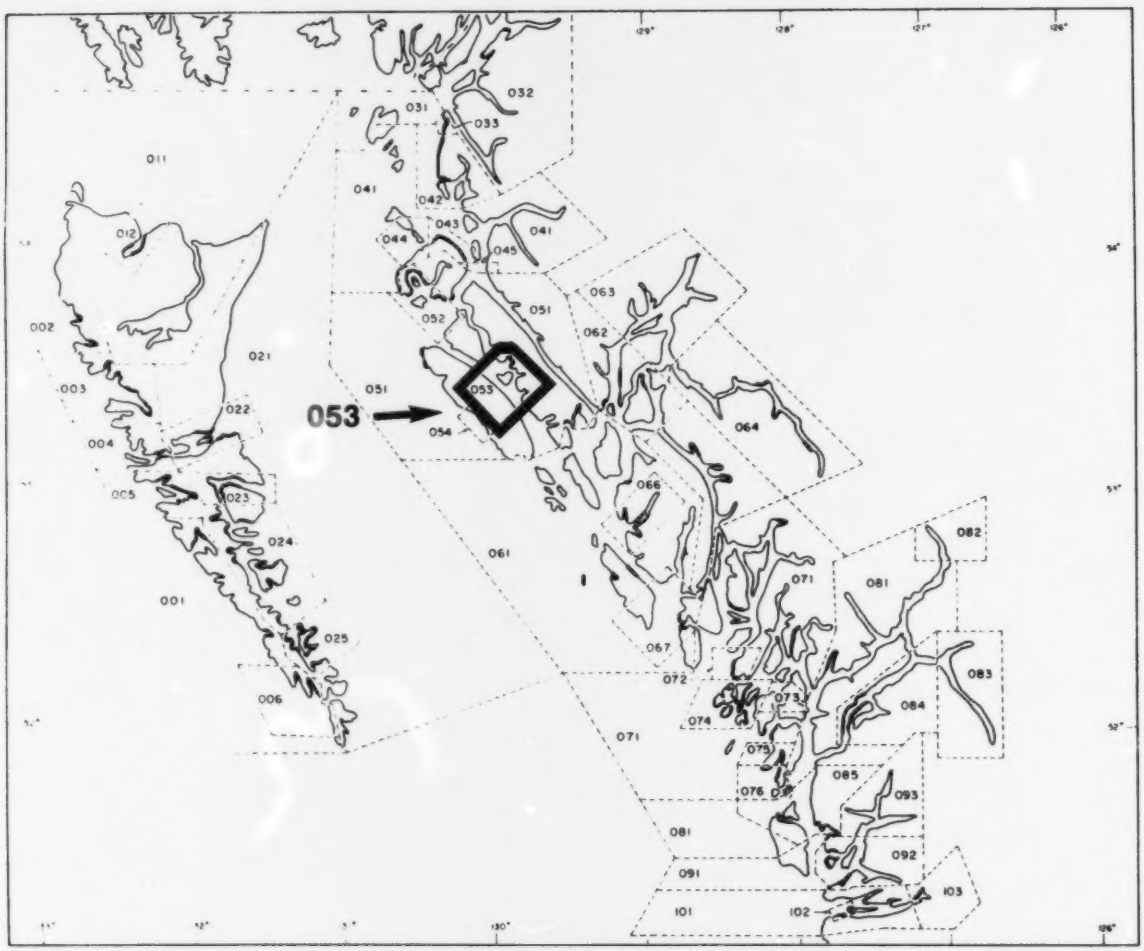


Fig. 053-1. Overview map showing location of section 053, Anger Island.

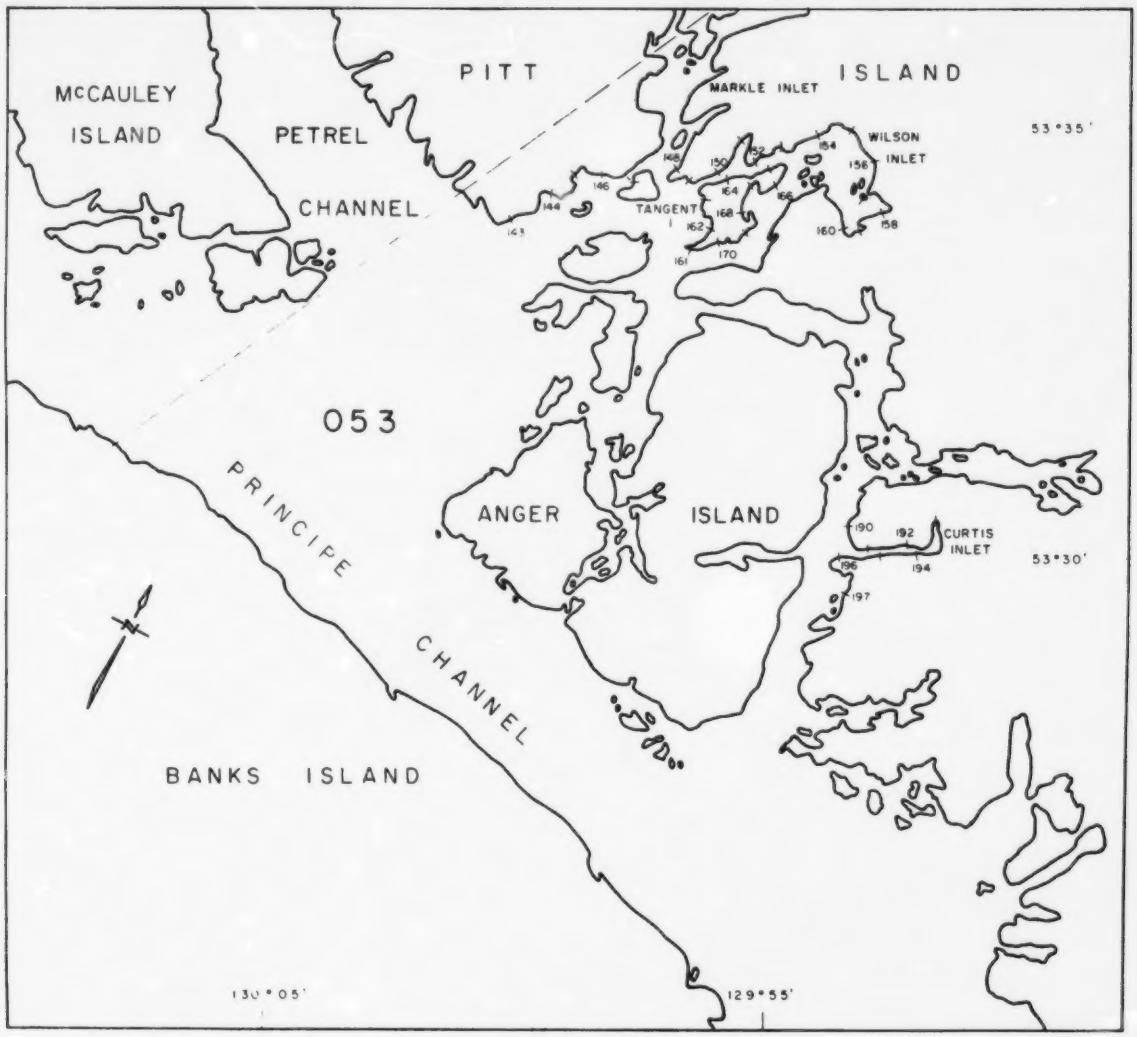


Fig. 053-2. Detailed map of section 053, Anger Island.

Table 053-1. Section 053 - spawn position by year.

```
      144.00     154.00     164.00
        +----+----+----+----+----
1937    +
1938    +
1939    +
1940    +
1941    +
1942    +
1943    +
1944    +
1945    +
1946    +
1947    +
1948    +
1949    +
1950    +
1951    +
1952    +
1953    +
1954    +
1955    +    aabcccbaaa
1956    + 1  11              11
1957    +      agb
1958    +     121111
1959    +
1960    +
1961    +    1
1962    +
1963    +
1964    +         31          122
1965    +
1966    +
1967    +
1968    +
1969    +
1970    +                  11
1971    +     111
1972    +
1973    +
1974    +     1
1975    +
1976    +
1977    +
1978    +
1979    +
1980    +
1981    +
1982    +
1983    +       d
1984    +                  g
1985    +       j
1986    +
        +----+----+----+----+----
      144.00     154.00     164.00

                  M/         T
                  AW         A
                  RI         N
                  KL         G
                  LS         E
                  EO         N
                   N         T
                   I
                  NI         I
                  LI         S
                  EN         L
                  TL         A
                   E         N
                   T         D
```

Table 053-2. Section 053 - histogram of cumulative spawn frequency over distance

	position(km)	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75	vara	varh	varc	all
	143.00	+	0	0	0	0
	144.00	+	0	0	0	0
	145.00	+*	1	0	0	1
	146.00	+	0	0	0	0
	147.00	+	0	0	0	0
	148.00	+**0	2	1	0	3
	149.00	+*0	1	1	0	2
	150.00	+***00	3	2	0	5
	151.00	+***0000	3	4	0	7
MARKLE INLET/WILSON INLET	152.00	+**00000000000000000000000000	2	24	0	26
	153.00	+*00000	1	5	0	6
	154.00	+****00	4	2	0	6
	155.00	+**0	2	1	0	3
	156.00	+0	0	1	0	1
	157.00	+0	0	1	0	1
	158.00	+	0	0	0	0
	159.00	+	0	0	0	0
	160.00	+	0	0	0	0
	161.00	+*	1	0	0	1
TANGENT ISLAND	162.00	+*0000000	1	7	0	8
	163.00	+*	1	0	0	1
	164.00	+*	1	0	0	1
	165.00	+*	1	0	0	1
	166.00	+**	2	0	0	2
	167.00	+**	2	0	0	2
	168.00	+	0	0	0	0
	169.00	+	0	0	0	0
	170.00	+	0	0	0	0
	171.00	+	0	0	0	0
	172.00	+	0	0	0	0
	173.00	+	0	0	0	0
	174.00	+	0	0	0	0
	175.00	+	0	0	0	0
	176.00	+	0	0	0	0
		0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75	vara	varh	varc	all

Table 053-2 (cont'd.)

position(km)

		0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	vara	varh	varc	all
	177.00	+																0	0	0	0
	178.00	+																0	0	0	0
	179.00	+																0	0	0	0
	180.00	+																0	0	0	0
	181.00	+																0	0	0	0
	182.00	+																0	0	0	0
	183.00	+																0	0	0	0
	184.00	+																0	0	0	0
	185.00	+																0	0	0	0
	186.00	+																0	0	0	0
	187.00	+																0	0	0	0
	188.00	+																0	0	0	0
	189.00	+																0	0	0	0
	190.00	+																0	0	0	0
	191.00	+																0	0	0	0
	192.00	+II																0	0	2	2
CURTIS INLET	193.00	+II																0	0	2	2
	194.00	+																0	0	0	0
			0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	vara	varh	varc	all

Table 053-3. Herring statistical spawn summary for section 053.

Year	Total records	Spawn index	Sum length	Av wid	Av int	Av date	SE date	Wt date	Min day	Max day	Ind day	Ind loc
1937	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1938	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1939	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1940	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1941	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1942	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1943	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1944	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1945	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1946	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1947	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1948	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1949	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1950	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1951	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1952	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1953	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1954	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1955	3	156393	16452	8	5.0	116.0	0.00	116.0	116	116	1	1
1956	3	17377	1828	9	5.0	114.0	0.00	114.0	114	114	1	1
1957	7	34925	3674	9	4.7	109.6	2.43	111.9	95	112	2	2
1958	2	43937	4622	14	3.0	98.0	2.00	96.8	96	100	2	1
1959	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1960	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1961	1	437	46	9	3.0	105.0	0.00	105.0	105	105	1	1
1962	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1963	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1964	6	39098	4113	16	5.0	110.3	1.48	111.6	108	115	2	2
1965	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1966	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1967	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1968	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1969	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1970	1	12168	1280	5	5.0	121.0	0.00	121.0	121	121	1	1
1971	1	13470	1417	4	4.0	131.0	0.00	131.0	131	131	1	1
1972	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1973	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1974	1	1740	183	5	7.0	130.0	0.00	130.0	130	130	1	1
1975	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1976	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1977	2	1217	128	3	4.0	163.0	0.00	163.0	163	163	1	1
1978	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1979	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1980	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1981	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1982	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
1983	4	3907	411	26	0.0	115.0	0.00	115.0	115	115	1	1
1984	7	17824	1875	36	0.0	124.0	0.00	124.0	124	124	1	1
1985	10	19725	2075	30	0.0	103.0	0.00	103.0	103	103	1	1
1986	0	0	0	0	0.0	0.0	0.00	0.0	0	0	0	0
All	48	362217	38104	19	4.7	114.3	1.94	113.3	95	163	15	4

Table 053-4. Spawn summary for section 053 from 1937 to 1986.

A. GENERAL:

There are two main spawning areas in Principe Channel:
(i) Wilson Inlet-Tangent Island and
(ii) Curtis Inlet

B. COMPLETENESS OF RECORDS:

Probably all spawning records prior to 1955 are incomplete.

C. SPAWNING CONSISTENCY OVER TIME: INFREQUENT

There have been intermittent spawnings since 1955.

D. MAGNITUDE OF SPAWNINGS: VERY SMALL

1. NUMBER OF SPAWN YEARS/50 YEARS	= 13/50 (1937-86)
2. NUMBER OF SPAWN YEARS/DOCUMENTED YEARS	= 13/32 (1955-86)
3. CUMULATIVE SPAWN LENGTH	= 38.1 Km.
4. CUMULATIVE SPAWN AREA	= 36.2 ha.

E. SPAWNING TIME:

1. MEAN UNWEIGHTED DATE (DOY)	= April 24 (114.3)
2. MEAN WEIGHTED DATE (DOY)	= April 23 (113.3)

F. COMMENTS:

The similar spawning dates and geographical proximity suggest that the infrequent spawns in Principe Channel belong to the much larger Kitkatla spawning stock to the north in section 052.

G. ROE FISHERIES:

No major roe fisheries are documented.